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New York Zoological Society . . .

In New York and Around the World



Bronx Zoo



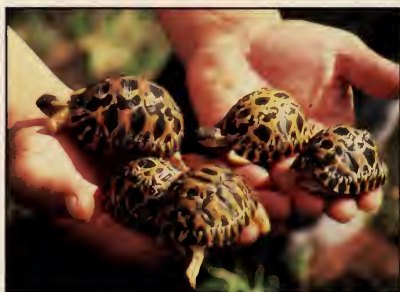
New York Aquarium



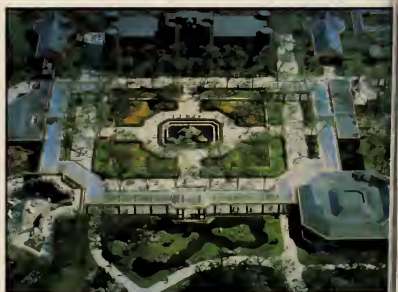
Wildlife Conservation International



Osborn Laboratories of Marine Sciences



Wildlife Survival Center



City Zoos Project

Education, Conservation, and Research

The New York Zoological Society, a private, non-profit organization, was chartered by the State of New York in 1895, "for the promotion of zoology. . . the instruction and recreation of the people. . . zoological research and publication, the protection of wild animal life, and kindred purposes." Today, the Society continues to pursue these goals in New York and globally, but with an ever greater sense of urgency about preserving rapidly vanishing wildlife, supporting conservation efforts in the field, conducting research in animal health and husbandry, instilling biological literacy and respect for nature in a largely urban audience, and providing respite for the same audience.

The Society currently operates five distinct but inter-related divisions: the Bronx Zoo; the New York Aquarium and Osborn Laboratories of Marine Sciences in Brooklyn; Wildlife Conservation International (WCI), with field projects around the world; and the Wildlife Survival Center on St. Catherine's Island, Georgia. Under an agreement with the City of New York, the Society is also renovating and will assume management of the zoos in Central Park, Prospect Park, and Flushing Meadows Park.

The **Bronx Zoo** opened in 1899 and is still the largest urban zoo in the United States. The 265-acre park houses 4,273 animals of more than 650 species and subspecies in surroundings resembling their natural habitats as closely as possible. Recent years have seen the opening of several remarkable exhibitions, including the World of Darkness (1969), the first exhibition to successfully reverse night and day; the Lila Acheson Wallace World of Birds (1972), with its innovative habitats, treetop exhibits, and interpretive displays of bird and plant life; Wild Asia (1977), a thirty-eight-acre habitat for endangered Asian species; the expanded Children's Zoo (1981); the Carter Giraffe Building for the Zoo's breeding collections of giraffes, zebras, cheetah, slender-horned gazelles, and ostriches; the Harry DeJure Aviary in the refurbished Great Flying Cage (both 1982); the Animal Health Center, a modern facility for veterinary care of the Society's animals and research in zoological medicine; JungleWorld, a complex of spectacular indoor habitats for tropical Asian wildlife (both 1985); and the Himalayan Highlands (1986), a mountaineer and marsh habitat for snow leopards, red pandas, tragopans, and white-naped cranes.

These exhibitions and facilities are part of a comprehensive program of renewal and growth that has come to be called "Zoo Renaissance," and each has been important to the development of new audiences for the Zoo. In fiscal 1987, the Children's Zoo alone was visited by 660,834 people, the Bengali Express monorail provided guided tours through Wild Asia

for 567,652, and JungleWorld admitted 472,399. Overall, Zoo attendance for the year was 2,183,357.

To interpret the Zoo's collections, the Society maintains the oldest and most diverse zoo education program in the United States. During the year, 24,017 students and teachers in 800 organized groups and 3,021 general audience adults and children took part in classes and special seminars at the Zoo. The number of children in school groups visiting the Zoo was 342,095. In addition, the volunteer organization of the Education Department, the Friends of the Zoo, gave guided tours to a total of 14,704 children in organized groups during the year.

Project WIZE ("Wildlife Inquiry Through Zoo Education") is a current example of the Education Department's national leadership. This collaborative project, planned and designed by the Bronx Zoo's education staff, is the first wildlife survival curriculum linking zoos and classroom learning to be published for secondary schools. To date, it has been used by some 50,000 students in the United States, Canada, Australia, and Belize and is being tested in Venezuela, Peru, Argentina, Thailand, and Sierra Leone.

Founded independently in 1896, the **New York Aquarium** celebrated its 90th Anniversary on December 10, 1986. The Aquarium became part of the New York Zoological Society in 1902, and has been located at Coney Island since 1957. More than 2,500 specimens of 304 aquatic species are on view in fifty exhibitions, including Our Native Sea Life (1974), the spectacular Shark Tank, which opened in 1980; the Bermuda Triangle and African Rift Lake (both 1981); Giant Japanese Spider Crabs (1984); European Cuttlefish (1985); and the Red Sea Exhibit (1986).

Among the 706,622 visitors to the Aquarium in 1986 were 240,777 schoolchildren in 6,572 organized groups. In addition, 27,378 children and adults attended 713 classes and programs. The Aquarium has pioneered in family education for years and works closely with local school boards on several innovative programs for primary and secondary school students.

Now in the midst of renewal, the Aquarium recently completed the Marine Mammal Holding Facility and renovated its Beluga Whale Tank. Construction is underway on Discovery Cove, a major new education-exhibition facility; and plans are being completed for Sea Cliffs, an indoor-outdoor coastal habitat exhibition for seals, walruses, penguins, and sea otters.

Like all the Zoological Society's programs involving rare and endangered animals, the Aquarium is engaged in captive breeding for a number of species. Black-footed penguins have bred with great success for several years, and a breeding program for beluga

whales is being developed. For many years, the Aquarium has also served as a rescue and rehabilitation center for stranded marine animals, including harbor seals, whales, and sea turtles.

The Society's tradition of joining research and conservation with exhibition and education is exemplified by the union of the Aquarium with its sister institution on Coney Island, the **Osborn Laboratories of Marine Science (OLMS)**, dedicated in 1967. The two institutions work together closely, with the Aquarium providing a tremendous range of subjects for study by OLMS scientists, and OLMS conducting tests and studies that are essential to the care, breeding, and nutrition of the Aquarium collection.

OLMS studies in fish genetics have contributed significantly to aquaculture and biomedical research. The development of highly inbred stocks of fish, some started more than seventy-five generations ago, has resulted in a genetic uniformity and reproducibility that has been essential for basic research on hormones, drugs, pollutants, and other toxins, as well as on growth, reproduction, sex determination, and the origins of cancer.

Other areas of study are pathology, microbiology, physiology, pharmacology, bio-organic chemistry, virology, embryology, pollution, planktonology, and vertebrate biology. OLMS offers post-doctoral fellowships in aquaculture, and the opportunity for undergraduate students to receive credit toward their college degrees by assisting in research projects.

The **City Zoos Project** was launched in 1980, when the New York Zoological Society signed the first of two agreements to renovate and ultimately take over operation of the three zoos run by the City of New York's Department of Parks and Recreation. These outmoded, severely inadequate facilities in Central Park, Manhattan; Prospect Park, Brooklyn; and Flushing Meadows Park, Queens, are being completely redesigned to reflect modern concerns with conservation, education, and habitat exhibition.

The Central Park Zoo renovation is nearly complete and scheduled to open in spring 1988. In effect, the Society has agreed to use its 92 years of experience and expertise to create an entirely new City zoo system built around the Bronx Zoo's zoological, educational, veterinary, and other support services. Yearly attendance for the Society's five exhibition facilities is expected to approach five million.

Beginning with a survey of Alaskan wildlife in 1897, the Society has operated the world's senior non-governmental conservation program for 90 years. With a staff of ten full-time zoologists, two based at the Bronx Zoo and eight in the field, **Wildlife Conservation International (WCI)** currently sponsors 70 projects

in 35 countries, primarily in Africa, Asia, and Latin America, developing the scientific information and institutional support necessary for the management and preservation of wildlife resources. WCI scientists help to establish parks and reserves, train parks administrators and scientists, study the status of vanishing species, plan accommodations between ecology and economic development, and even equip special conservation and education programs.

WCI Director George Schaller, having concluded his work with the giant panda in China, is now conducting a wildlife survey on the Tibetan plateau. Other major projects include David Western's long-term monitoring of wildlife in Kenya's Amboseli Park, Thomas Struhsaker's studies of primates and the tropical rain-forest ecology of Kibale Forest in Uganda, and Archie Carr's participation in the development of a comprehensive environmental plan for Belize in Central America. Major projects also include the protection of Magellanic penguins and other Argentinian wildlife under William Conway's leadership; the study of clouded leopards and their ecology in Thailand by Alan Rabinowitz; Stuart Strahl's work with endangered birds in Venezuela; Charles Munn's efforts on behalf of macaws and the threatened wilderness of Manu National Park, Peru; and Patricia Moechman's research on jackals and assessment of conservation needs in the Ngorongoro Crater of Tanzania.

An important part of the Society's commitment to conservation is its work in captive propagation. Breeding programs at the **Wildlife Survival Center** on St. Catherine's Island, Georgia, complement those at the Zoo and Aquarium. This refuge, established in 1974, provides a spacious natural setting for large breeding groups of endangered species—particularly antelopes, marsupials, tortoises, and birds. Altogether, some 1,500 mammals, birds, reptiles, amphibians, and fishes were born or hatched at the Bronx Zoo, Aquarium, and Wildlife Survival Center during 1986. These included offspring in 66 endangered species.

Veterinary care for all NYZS animal collections is administered by the **Animal Health Center**, the Bronx Zoo's modern research hospital and heir to a program that was established in 1902 and has pioneered in tuberculosis control, preventive medicine, radiography, antibiotics use, immobilization techniques, and vitamin supplementation. Major research projects at the Center are devoted to the reproduction biology of vanishing species (developing knowledge and techniques that will improve captive breeding), and to a broad range of nutritional subjects, including the role of key vitamins and minerals in animal diets. The Center also offers training for veterinary students, interns, and technicians as well as Zoo and WCI field staff.

(continued on page 75)

Table of Contents

Education, Conservation, and Research	1
Trustees and Advisors	4
Report of the President	7
Report of the General Director	11
New York Zoological Park (Bronx Zoo)	15
Mammalogy	15
Ornithology	17
Herpetology	19
Wildlife Survival Center	21
Animal Health	23
Zoo Education	25
Exhibition and Graphic Arts	29
Operations	31
New York Aquarium	33
Osborn Laboratories of Marine Sciences	38
City Zoos Project	39
Wildlife Conservation International	41
WCI Field Projects Around the World	46
Public Affairs	49
Publications Department	52
Administrative Services	53
Admissions, Parking, Transportation, and Group Sales	53
Food and Souvenirs	53
Personnel	53
1986-87 Publications and Papers by NYZS Staff and Associates	54
Report of the Treasurer	57
Contributions, Pledges, and Payments on Pledges	68
Committees of the New York Zoological Society	74
Staff of the New York Zoological Society	75
Recommended Form of Bequest	79
1986-87 Highlights and Vital Statistics	80

The City of New York, through its Department of Cultural Affairs, provides annual operating support for the Bronx Zoo and the New York Aquarium, both of which occupy City-owned buildings on City-owned property.

The Society also receives funds annually from the Natural Heritage Trust, a program of the New York State Office of Parks and Recreation.

In 1987, the New York Zoological Society adopted a new logo (left), to be used for all NYZS divisions. The silhouette of a male and female impala, representative of the great wildlife spectacles of East Africa, is by the noted artist Ugo Mochi, to whose estate the Society is grateful for permission to use the drawing.



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A copy of this annual report may be obtained by writing to the New York Department of State, Office of Charities Registration, 162 Washington Avenue, Albany, New York 12231, or to the New York Zoological Society.



Report of the President

At the Bronx Zoo we greeted giant pandas from China, opened the Himalayan Highlands, completed the Meerkat Exhibit, began construction of a new cogeneration and district heating system, and celebrated the Women's Committee's fifteenth anniversary. At the New York Aquarium we marked ninety years in existence and thirty years in Brooklyn, inaugurated the Red Sea Exhibit, and welcomed more visitors than in any year since 1972. At the Wildlife Survival Center in Georgia we hosted a crucial conference on the survival of highly endangered lemurs in Madagascar. At the Central Park Zoo we entered the final year of construction, preparing for a grand reopening in 1988. And also in Manhattan we convened Conservation 2100, a four-day colloquium on the future of the natural world organized by the Society's field research program, Wildlife Conservation International.

For these and other projects and events in the New York Zoological Society's ninety-second year, detailed in the following pages, there was an extraordinary constellation of supporters. The Henry and Lucy Moses Fund gave \$1 million for the Central Park Zoo's Temperate Territory, and the new zoo received \$250,000 from the Charles Hayden Foundation and \$610,000 from funds associated with the late Lila Acheson Wallace, including a special trust fund created for the Society. Discovery Cove, nearing the completion of its building construction phase, received \$100,000 each from the Atholl McBean Foundation and The Schiff Foundation. VeldtLab, part of the African Plaza and Plateau project, has been funded by \$250,000 from The Nichols Foundation, through the generosity of its president and NYZS Honorary Chairman of the Board Charles W. Nichols, Jr.

In the area of endowment, JungleWorld was the chief recipient of an extraordinary \$5 million gift from Trustee Enid A. Haupt for the maintenance of exhibitions and collections in this distinctive and innovative building. Mrs. Haupt's earlier contributions of \$5.1 million were largely responsible for the creation of JungleWorld's habitat exhibitions. The Marilyn Simpson Charitable Trust established an endowment fund of \$150,000 to support the Society's crucial research in zoological medicine.

Other vital donations included \$270,000 from the Edward John Noble Foundation for the Wildlife Survival Center's captive breeding programs and major gifts for Wildlife Conservation International from the Liz Claiborne and Art Ortenberg Foundation and the Jessie Smith Noyes Foundation.



Giant pandas began their stay at the Bronx Zoo with the sound of a gong, wielded by Deputy Mayor Feng Mingwei of Beijing and Mayor Edward Koch of New York City, as NYZS President Howard Phipps, Jr. looked on.

Many of the year's events seemed to revolve around the work of the Women's Committee, which capped its fifteenth year with the "Crystal Celebration" at the Bronx Zoo, a gala dinner co-chaired by Mrs. Harmon L. Remmel and Mrs. Joseph A. Thomas, with Mrs. Vincent Astor as Honorary Chairman. Himalayan Highlands, dedicated on September 26 by Committee President and NYZS Advisor Dailey Pattee, was supported in large part by Committee benefits over the years. It gives the Bronx Zoo the most remarkable habitat exhibition for endangered snow leopards in the world. An individual gift of \$250,000 from Mrs. Pattee and her husband Gordon underwrote the Giant Panda Exhibit, where more than one million visitors were expected to see Yong Yong and Ling Ling during their six-month visit from China. Another gift of \$250,000, from the Anne Laurie Aitken Charitable Trust, was made through the Women's Committee for the renovation of the Elephant House, particularly the beautification of its outdoor habitats. (The Elephant House complex, renamed the Keith W. Johnson Zoo Center, received earlier major support from The Vincent Astor Foundation, the Women's Committee, and the Robert Wood Johnson 1962 Charitable Trust, along with the City of New York.) Much credit goes to Mrs. Pattee for her two-year stewardship, and we now welcome Leslie Perkin as president for the next two years.

Society programs and capital projects were supported on many levels, under the leadership of the Development and Conservation committees, chaired by John Pierrepont; the Annual Patrons, chaired by John Chancellor and John Elliott; the Aquarium and Osborn Laboratories Planning Committee, chaired by Dr. Henry Clay Frick II; and the Business Committee, newly chaired by Marshall Manley, president and CEO of The Home Group, Inc. Dues, gifts, pledges, and bequests totaling \$18,678,081 were generated by 30,816 members, 330 Annual Patrons, nearly 200 private foundations, more than 100 corporations, and thousands of individual contributors. Subscribers to *Animal Kingdom* magazine reached a new high of 155,437.

Millions of others help to support the Society through taxes to the City, State, and Federal governments. City funding, primarily through the Department of Cultural Affairs, totaled \$8,135,993. The State of New York provided \$2,068,743 through the Natura Heritage Trust and the New York State Council for the Arts. The Federal government's Institute of Museum Services, National Institutes of Health, and National Science Foundation granted a total of \$299,205.

As the base of the Society's support system has grown, so has the scope of its activities. Through the Bronx Zoo and New York Aquarium, soon to be joined by the Central Park Zoo, the Society provides recreation and education for more people than ever in the New York metropolitan area. Our national and international role in conservation and education increasingly shapes what we do here at home. Our job now is to continue extending the spiral of awareness and action that has enabled us to reach as far as we have on behalf of the world's wildlife.

The NYZS Board of Trustees and staff noted with sorrow the passing of two honored and irreplaceable associates. John M. Schiff became a Trustee in 1931, moved to the Board of Advisors in 1976, and was among the original Honorary Trustees to be named in 1980. He served on the Finance Committee for several years. Beginning with William Beebe's deep-sea dives off Bermuda in 1932, Mr. Schiff supported a wide range of NYZS activities. Peter R. Gimbel, a world-renowned marine photographer and filmmaker, was particularly devoted to the work of the New York Aquarium, serving on the Aquarium and Osborn Laboratories Planning Committee for many years. Mr. Gimbel was an NYZS Trustee from 1956 to 1977, a longtime member of its Executive Committee, and an Advisor since 1978.

Several changes occurred in the Society's governing bodies during the year. Laurance Rockefeller, after fifty-two years of outstanding leadership in the Society, was named an Honorary Trustee. To the Board of Trustees we welcomed George V. Grune, Chairman and Chief Executive Officer of Reader's Digest; Robert Wood Johnson IV, a key figure in the Elephant House renewal; and Shirley Katzenbach, who has been so supportive of the Society's programs in animal health. Four new members were added to the Board of Advisors, two taking the places of Mr. Johnson and Mrs. Katzenbach. Mrs. John H. Culbertson is director of the F.M. Kirby Foundation and a benefactor of the Animal Health Center. Marshall Manley, President and Chief Executive Officer of the Home Group, Inc., has already led a successful year of corporate fund-raising for the Society. C. Walter Nichols 3rd, vice-president of Morgan Guaranty Trust, carries on his family's deep commitment to international conservation. And Mrs. Richard B. Tweedy, also dedicated to conservation, has been especially helpful to projects in Argentina and Uganda.

Howard Phipps, Jr.
President



Report of the General Director

A different institution

In June, two years after it was started, the human population clock at JungleWorld in the Bronx Zoo "struck" five billion. At about the same time, it was estimated that African black rhinoceroses had declined to 3,800.

No one knows who the five billionth person actually is (humans are increasing about 150 every minute), but chances are eight to two that he or she was born in a "less developed" tropical country, for that is where eighty percent of all human births now take place. It is also where the vast majority of the earth's most spectacular wild creatures live—the planet's treasure house of biodiversity. It is where the 3,801st rhinoceros was killed for its horn.

These are not observations likely to appear in the opening paragraphs of other New York cultural institutions' annual reports. Despite shared geography, visitation, and many common interests, it is the differences in institutions that account for so much variety in the City's cultural fabric. And among the dissimilar, the New York Zoological Society seems both more dissimilar and more varied. At one and the same time, the Society is a great local exposition of living wildlife, a worldwide program of wildlife conservation, and an international school of environmental education.

Alone among the major cultural institutions, the Society cares for great living aggregations of wild creatures. Like ourselves, and unlike the charges of most other institutions, these creatures die. They are helplessly dependent on the Society's daily, sometimes hourly care, and on the maintenance of the environmental systems and specialized techniques that sustain them. Thus, they comprise the most delicate and vulnerable of all cultural, educational, and scientific collections—incomparably so.

Living in the Age of Information, we are used to having data about the real world at our fingertips, so much that we may confuse the illusory understandability of fragmentary facts with the complexity of life. Museums and libraries help to provide details about wild animals; so do the Zoo and Aquarium, but they also provide the real phenomena—alive. Nothing contains so much information about a living creature as the creature itself, or offers so rich an opportunity to discover new facts about life forms.

Best of all, living collections are unique in that they can reproduce. The results are not forgeries or imitations but original progeny carrying genetic information unique to each species, usually to each individual, encoded separately, yet sharing a common basis



Since 1984, when black rhinos appeared on the cover of the NYZS Annual Report, their population in Africa has declined from 13,000 to 3,800.

over thousands and millions of years. But it is a shared complexity wherein tiny variations make vast differences. Few of us would have anticipated the recent discovery that people and chimpanzees share in common ninety-nine percent of their genes. Today, as never before, the reproduction of zoo and aquarium animals imposes demands for knowledge, research, and specialized facilities. Captive breeding has become essential not only to the survival of zoological institutions, which in most cases no longer collect in the wild, but also to the survival of increasing numbers of endangered species. And the reintroduction of some of these species to nature, now gradually beginning, is the most exciting adventure in restoration ever contemplated, its ecological implications far surpassing its historical ones.

Nearly 1,500 animals were born or hatched at NYZS facilities last year; some seventy vanishing species reproduced. Today, more than ninety percent of all mammals added to North American zoos are bred in zoos—credit to a remarkably sustained collective effort, but as yet far from adequate. Tomorrow, zoos will have to care for an ever greater number of species, as they lose their homes in nature, while resupplying other areas that have been newly restored. The zoo is beginning to fulfill a unique role for society—as a storehouse of life's diminishing diversity.

In 1970, a New York Zoological Society scientist calculated that there were 60,000 black rhinoceroses in Africa. Their decline to 3,800 in seventeen years is a particularly visible but hardly unique measure of the acceleration of wildlife extinction. In the same period, countless species, mostly invertebrate and mostly not even catalogued, became totally extinct. We now realize that fifteen to twenty percent of all the remaining species on earth will probably be lost in the next decade or two, more than one million species of animals and plants.

Every aspect of the New York Zoological Society's operations is deeply affected by this realization of impending loss. Comparable might be the prospect for a museum or library of having no more art, books, or historical documents available. Extinction is final, irrevocable. Thus the Society is inevitably and wholeheartedly involved in the growing worldwide attempt to restrain and diminish this "anthropogenic" destruction.

While many museums and libraries take pride in the outreach of their programs, the Society is unparalleled in such efforts. During the past year, Wildlife Conservation International sponsored fifty-seven field projects in thirty-one countries (see pages 41-47). WCI now has eight full-time scientists overseas. Their own studies,

the grants they supervised, and projects conducted by other NYZS divisions ranged from teaching ecological education techniques to schoolteachers in Belize to investigating the dynamics of savanna ecology in East Africa. They were particularly powerful in discovering and conveying original scientific information to decision-makers in less developed nations, an essential part of forming intelligent plans for development.

Peaks in the pages that follow

News of such exertions fill this report. One story concerns the NYZS-sponsored Conservation 2100, organized by WCI's David Western and Mary Pearl, a most unusual international conference that looked into the future of conservation rather than its past. Others describe breeding successes, the loan of giant pandas from Beijing, the opening of a pioneering conservation-propagation habitat for endangered snow leopards, and the exhibition of rarely seen fishes at the Aquarium. They reveal synergisms, emerging from the combined skills of field scientists, curators, veterinarians, educators, editors, animal managers, nutritionists, exhibition designers, fund-raisers, and many other professionals, that distinguish the Society among wildlife organizations.

Two examples of such synergism, not covered in the report, are of special significance:

First, a demanding collegial exercise in long-term planning, coordinated by Kathleen Wilson, has occupied virtually all staff members for much of the year. Its results, now being compiled and evaluated, promise not only a quantum jump in the Society's basic institutional roles but also answers to resistant operational problems and a new Society-wide ranking of priorities.

Second, the multivalent science of conservation biology, which provides the foundation for all sound conservation action, finally became a recognized academic discipline as the result of persistent efforts over several years by some of the nation's leading conservation scientists. The same efforts gave birth to the Society for Conservation Biology, which on June 25 made its first award to the New York Zoological Society for its pioneering and ongoing roles in this field.

Although few count rhinoceroses, there is no doubt that rhinoceroses count. That is the real world in which the New York Zoological Society continues to involve itself.

William Conway
General Director



New York Zoological Park (Bronx Zoo)

Mammalogy

Envoys of giant panda conservation

For seven years Mayor Edward Koch expressed his hope that giant pandas might one day make a reappearance in New York. The Mayor's hopes, and efforts, were rewarded in December 1986, when a cable from the mayor of Beijing, New York's Sister City in China, approved the loan of giant pandas to the City and the Bronx Zoo. In February, General Curator James Doherty and Director of Administrative Services John McKew flew to Beijing, where they and an official of New York's Sister City Program signed a loan agreement with the Chinese Association of Zoological Gardens and made arrangements to have two non-breeding pandas sent to the Zoo in mid-April.

This left two months in which to obtain the necessary permits for the visit of an endangered species, to rebuild exhibit and holding facilities that had been constructed for pandas in the 1930s, to arrange for weekly shipment of the enormous amount of bamboo that pandas need, to design public areas and educational graphics, and generally to forge a plan of public accommodation. In an enormous cooperative effort among the Mammalogy, Exhibition and Graphic Arts, Operations, and other departments, the task was accomplished in time for the arrival of Yong Yong and Ling Ling, along with a three-person Chinese technical team, in mid-April. The animals settled in, and captivated crowds began to fill the stepped viewing area on April 30.

Visitors to the exhibit learned, hopefully, that there are now only about 700 giant pandas remaining in the wild, and that the Chinese government has established twelve forest reserves in Sichuan, Shaanxi, and Gansu provinces to preserve this national treasure. They also learned about NYZS collaboration with Chinese scientists and officials in panda conservation research, particularly the work of Dr. George Schaller in China from 1980 to 1985. Proceeds from admission to the exhibit were designated for the panda conservation program in China.

From Manhattan schist to Himalayan gneiss

Another group of Asian animals was celebrated with the opening of the Himalayan Highlands on September 26, 1986. On a hillside of Manhattan schist, red oaks, and tulip trees was fashioned a series of spectacular Himalayan landscapes for snow leopards, tragopans, and red pandas, with white-naped cranes occupying a marshy area across the way. Behind the scenes are sixteen video-monitored holding and breeding areas for the Zoo's unmatched group of highly endangered snow leopards, which have produced more than four dozen cubs in five generations.

In recognition of its snow leopard breeding achievements, the Society was presented with the Edward H.

Bean Award at the 1986 meeting of the American Association of Zoos and Aquariums. As though to confirm the award, the females Olga and Hoth then produced two cubs each in June 1987, their first breeding season in Himalayan Highlands. Two of the cubs were the first sired by Bisser, who came from the Moscow Zoo in 1985 in exchange for a female snow leopard born in the Bronx.

Some lively additions

A group of intensely social and active meerkats, members of the mongoose family, were installed in the Carter Giraffe Building, where they inhabit a carefully replicated segment of South Africa's Kalahari Desert. Constantly digging, climbing, or standing sentinel in their upright prairie dog manner, the meerkats immediately became a favorite with Zoo visitors.

A similar response greeted the white-nosed coatis when they made their first appearance at the Zoo since 1964 in a renewed outdoor exhibition near the Small Mammal House. These inquisitive members of the racoon family range all the way from the American Southwest to Paraguay.

Perhaps the most unusual of the newcomers, exhibited at the old Small Deer House, was a pair of babirusa, Indonesian members of the swine family that look something like tall pigs. A single babirusa was shown by the Zoo between 1929 and 1940, but this endangered species is now sorely in need of captive breeding, and a successful beginning was made toward that end with the Zoo's first babirusa birth in August 1986.

Other notable births included sea lion pups born within ten days of each other in June to three of the four females in the Sea Lion Pool. One of the mothers, E.P., was herself born in the Pool just four years ago. Proliferation continued in JungleWorld, with silvered leaf langurs, proboscis monkeys, white-cheeked gibbons, and small-clawed otters producing young. Elsewhere, there was a baby gorilla, giraffe, polar bear, and zebra.

Staff activities

Curator James Doherty, as a member of the I.U.C.N. black-footed ferret Captive Breeding Specialist Group, took part in preparing a management plan for the small surviving population of this severely endangered mammal, which is now under the care of the Wyoming Game and Fish Department. Promisingly, two of the eleven female ferrets gave birth, and seven young were raised, bringing the total known population to twenty-four. Mr. Doherty also prepared management plans for a herd of Pere David deer released in China's Nan Haizi Reserve and, as a member of the AAZPA Primate Committee, for keeping leaf-eating monkeys in captivity.



Babirusa ("pig deer"), from the marshy forests of Celebes and the Molucca Islands, successfully bred for the first time at the Zoo.

Dr. Fred Koontz was promoted to associate curator. He was invited to join the I.U.C.N. Species Survival Committee for Insectivores, Tree Shrews, and Elephant Shrews, and in May participated in the Second Lemur Conservation Workshop at the Wildlife Survival Center. For their study of the feed intake and digestive efficiency of the proboscis monkey, Dr. Koontz and Nutritionist Dr. Ellen Dierenfeld were awarded a Nixon Griffis Fund for Zoological Research grant.

In July 1986, Collections Manager Fred Sterling escorted back from Malaysia three proboscis monkey that had been confiscated by the Malaysian Ministry of Forestry and presented to the Society. A female from this group later gave birth in JungleWorld.

After a year as a curatorial intern, Dr. Clifford Rice left the department to resume his fieldwork in Asia. Dr. Michael Hutchins was appointed conservation biologist in the Animal Management Services Department.

Mammal Census, Bronx Zoo (as of December 31, 1986)

Orders	Families	Species and subspecies	Specimens in Zoo	Specimens owned
Marsupialia—Kangaroos, phalanger, etc.	2	3	89	96
Insectivora—Hedgehogs	1	1	1	1
Scandentia—Shrews	1	1	11	11
Chiroptera—Bats	4	10	842	841
Primates—Apes, monkeys, marmosets, etc.	6	20	194	202
Edentata—Armadillos, sloths, anteaters	1	1	0	1
Rodentia—Squirrels, mice, porcupines, etc.	9	22	167	165
Carnivora—Bears, raccoons, cats, dogs, etc.	6	26	106	102
Pinnipedia—Sea lions, etc.	1	1	6	6
Proboscidea—Elephants	1	1	6	8
Perissodactyla—Horses, rhinoceroses, etc.	3	5	42	50
Artiodactyla—Cattle, sheep, antelope, etc.	8	31	576	615
Totals	43	122	2,040	2,098

N.B. Specimens in Zoo include 34 on loan to the NYZS from other collections. Specimens owned include 91 on loan to other collections from the NYZS. There were 63 species listed as endangered, threatened, or vulnerable. Births totaled 817.

Ornithology

Arrivals and improvements

A host of birds entered the collection during the year, enlivening several exhibitions and bolstering breeding programs. A new group of Inca terns from Peru joined the flocks of colonial sea birds in the DeJur Aviary. Two secretary birds are now part of the Thomson gazelle area in the African Plains. European avocets and sacred ibis were added to the Aquatic Bird House. And a brown sickle-billed bird of paradise is the latest member of that family, which has been the subject of NYZS conservation efforts in Papua New Guinea, to be shown in the World of Birds. In addition, a new mate has been found for the Zoo's male red-crowned crane. It is hoped that the breeding success of other endangered crane species will be emulated by these rare natives of northeast Asia and Japan.

At the World of Birds, the arid scrub exhibit was re-landscaped to enhance its topography and visibility. New cypress trees were obtained for renewal of the stratification exhibit in fall 1987. Improvements at Propagation I—a new insulated roof with skylights—make possible the kind of climate and light control needed to accommodate a wider range of birds and plants.

Breeding and research programs

Several species laid and hatched eggs for the first time at the Zoo. Included were pheasant pigeons, helmeted curassows, the Raggiana bird of paradise, and Wald-rapp ibis, the latter in their cliffside habitat near the entrance to JungleWorld.

There is even less precedence for the hatching of two palm cockatoos at the Wildlife Survival Center on St. Catherine's Island. In order to develop a protocol for future application, the chicks were hand-raised at the Bronx Zoo from the age of one week. While some questions still remain, the achievement is a significant one in a story which began in 1983, when Chairman Donald Bruning was instrumental in putting together a palm cockatoo breeding consortium, following the seizure of birds illegally exported from Indonesia.

The Society's interest in and success with breeding endangered white-naped cranes is reflected in Curator Christine Sheppard's chairmanship of the AAZPA Species Survival Plan for the species. Last year she produced a fourth edition of the *Grus vipio* studbook and chaired a meeting in which the principles of a survival plan were outlined for consideration. At the Zoo, a marshy habitat for white-naped cranes was opened as part of the Himalayan Highlands. The young pair on exhibit there laid their first eggs in April 1987.

Dr. Sheppard also began a study, using telemetry equipment disguised as an egg, of the incubation requirements of hooded and white-naped cranes, which should help to improve methods of artificial

incubation. Another study involved the dietary needs and digestive efficiency of parrot species.

Conservation, here and abroad

Department Chairman Donald Bruning became increasingly involved in avian conservation efforts, continuing to serve as chairman of the Wildlife Conservation Management Committee of AAZPA, of the AAZPA delegation to the Convention on International Trade in Endangered Species (CITES), and of the Parrot Specialist Group of the International Council for Bird Protection (ICBP).

In Mexico, Dr. Bruning discussed CITES with a number of government officials with the hope that they would sign the Convention in the near future. While there, he met with researchers to help coordinate international conservation efforts for the horned guan, a member of the cracid family that ranges throughout South and Central America. The furtherance of coop-



"O.T.", a palm cockatoo hatched at the Wildlife Survival Center and hand-raised at the Zoo, is a western hemisphere first.



Telemetry equipment, hidden in an artificial egg, is helping to clarify the nesting requirements of cranes.

erative efforts in breeding cracids with Dr. J. Estudillo Lopez in Mexico City was also on Dr. Bruning's agenda.

During an Asian trip in February, Dr. Bruning worked with Malaysian wildlife officials to plan captive breeding programs for several rare and endangered species of Malaysian pheasants. He then signed an agreement joining the ICBP, the AAZPA, and the Indonesian government in a program to send captive-bred Bali starlings in North American zoos to the Surabaya Zoo in eastern Java. Offspring bred at Surabaya would then be released in the wild to augment declining natural populations.

Back in New York, the Zoo offered a training course for officers of the State's Department of Environmental Conservation that was designed to help them identify birds covered by the recently passed Bird Bill and to discuss enforcement problems and other concerns. The department will continue to assist in the law's implementation.

Bird Census, Bronx Zoo (as of December 31, 1986)

Orders	Families	Species and subspecies	Specimens in Zoo	Specimens owned
Struthioniformes—Ostriches	1	1	3	3
Rheiformes—Rheas	1	1	8	8
Casuariiformes—Cassowaries, emu	2	2	6	5
Tinamiformes—Tinamous	1	2	5	5
Sphenisciformes—Penguins	1	1	10	5
Pelicaniformes—Pelicans, cormorants	2	4	7	7
Ciconiiformes—Hérons, storks, flamingos, etc.	5	14	120	128
Anseriformes—Swans, ducks, geese, screamers	2	41	166	168
Falconiformes—Vultures, hawks, eagles	3	6	18	16
Galliformes—Quail, pheasant, etc.	2	23	92	98
Gruiformes—Hemipodes, cranes, rails, etc.	4	20	91	110
Charadriiformes—Plovers, gulls, etc.	8	23	104	105
Columbiformes—Pigeons, doves	1	12	39	31
Psittaciformes—Parrots, etc.	3	24	77	81
Cuculiformes—Touracos	2	6	17	18
Strigiformes—Owls	2	8	11	12
Caprimulgiformes—Frogmouths	1	1	6	7
Apodiformes—Hummingbirds	1	2	5	5
Trogoniformes—Quetzals	1	1	1	1
Coraciiformes—Kingfishers, hornbills, etc.	7	17	49	39
Piciformes—Barbets, toucans, woodpeckers	1	7	16	16
Passeriformes—Perching birds	22	93	273	276
Totals	73	309	1,124	1,144

N.B. Specimens in Zoo include 52 on loan from other collections. Specimens owned include 73 on loan to other collections from the NYZS. There were 95 species listed as endangered, threatened, or vulnerable. Hatchings totaled 337.

Herpetology

Another crocodilian success

South American broad-nosed caiman became the sixth endangered crocodilian species to breed successfully at the Bronx Zoo since 1980, double the number of any other zoo. Eighteen hatchlings were produced in the World of Darkness a few days after the end of the fiscal year by parents which were themselves hatched at the Atagawa Alligator Farm in Japan and arrived at the Zoo in 1985. This is believed to be the first second-generation hatch of an exotic crocodilian in captivity.

Yacare caiman, Cuban and Siamese crocodiles, Malaysian false gavials, and Chinese alligators are the other five endangered crocodilians that have reproduced at the zoo. These programs have been managed in just 1,500 square feet of breeding and nesting space, most of it within the 88-year-old Reptile House, pointing up the need for a new and much larger reptile and amphibian center at the Zoo.

Due to hide hunting, habitat modification, and outright persecution, crocodilian populations around the world have declined precipitously in recent years. The recovery of these dominant carnivores and the ecosystems in which they play such an important role depends in large part on the further development of such intensive management and propagation programs, and their adoption by other zoos, research facilities, and government breeding farms.

Breeding turtles, and others

Encouraging, too, were the successes of endangered turtle species. Twelve clutches of eggs were laid by two Coahuilan box turtles, resulting in thirty-four hatchlings. Since the first pairing in December 1985, more than fifty of this species, which lives only in the marshes of Quatro Ciénegas in north central Mexico, have been hatched at the Zoo. From closer to home, New York's bog turtle was bred for the fifteenth consecutive year; the hatchlings shared their Reptile House Nursery exhibit with youngsters of a more familiar relative—the spotted turtle.

Other offspring in the Nursery included Asian tentacle snakes, Kenya sand boas, Taylor's cantils from Mexico, Sinaloa milk snakes, South American anacondas and double-crested basilisk lizards, blood pythons and red-tailed ratsnakes from Thailand, and Ethiopian red spitting cobras.

New and renewed exhibits

At JungleWorld, a large female batagur, weighing sixty-two pounds after nineteen years at the Columbus Zoo, joined the eight other rapidly growing specimens of this giant Asian river turtle in the

lower montane rain-forest habitat. Two giant Asian softshell turtles were also added to this exhibit and can be seen swimming with other chelonians at the underwater viewing area.

New exhibits in the Reptile House featured New Guinea black tree monitors, African rhinoceros vipers, South American smoky jungle frogs, and an unusual pair of albinistic western diamondback rattlesnakes. Five Erabu sea snakes were received from Japan's Ueno Zoo, and two green sea turtles hatched at Florida's Marineland went on temporary display. The turtles will be released in the Atlantic when they outgrow their quarters.

Staff activities

Senior Keeper William Holmstrom was appointed Species Coordinator for the Malagasy radiated tortoise and was elected to the Madagascar ground boa Species Survival Plan Propagation Group of the AAZPA. Holmstrom also joined Senior Keeper Bruce Foster and keepers Joe Martinez and Frank Indivig-



The broad-nosed caiman was the sixth endangered crocodilian species to breed successfully at the Zoo.



This Asian water dragon is one of the larger creatures in JungleWorld's "Unseen Multitude" gallery.

lio (from the Ornithology Department) as team leaders for the third joint NYZS/Caribbean Conservation Corporation marine turtle-tagging mission at Tortuguero, Costa Rica. With more than 8,000 green sea turtles handled by the teams, it was the most successful season since the tagging program began more than thirty years ago under Dr. Archie Carr.

Superintendent Peter Brazaitis's long-term investigations into the gross morphology and molecular "finger-printing" of crocodilian skins continue to have an important application to international law enforcement in the reptile leather trade. In an ongoing effort, Brazaitis traveled to Brazil and Bolivia during the year to assist wildlife authorities in assessing the status and protection of their crocodilian resources.

Curator John Behler still served on the board of directors of the Society for the Study of Amphibians and Reptiles and on its Conservation Committee. He was appointed deputy chairman of the IUCN Freshwater Turtle and Tortoise Specialists Group and also coordinates the activities of the AAZPA Crocodilian Advisory Group.

Behler remains an advisor on herpetofaunal research to New York State's Department of Environmental Conservation. In December, he joined four other regional biologists on a panel appointed by the Westchester County executive to oversee the closure of the fifty-year-old Croton Landfill, which threatens the Hudson River ecosystem.

As coordinator of the Nixon Griffis Fund for Zoological Research, Behler oversaw proposal and project reviews. Thirteen projects from thirteen institutions were approved from among the July 1986 and January 1987 submissions.

Reptile and Amphibian Census, Bronx Zoo (as of December 31, 1986)

Amphibia orders	Families	Species and subspecies	Specimens in Zoo	Specimens owned
Caudata—Salamanders	2	4	9	9
Anura—Frogs, toads	8	19	65	62
Totals	10	23	74	71
Reptilia orders				
Chelonina—Turtles	8	42	242	258
Crocodylia—Alligators, caimans, crocodiles	2	10	96	143
Squamata (Sauria)—Lizards	9	23	69	74
Squamata (Serpentes)—Snakes	5	61	265	258
Totals	24	136	672	733

N.B. Specimens in Zoo include 68 on loan to the NYZS from other collections. Specimens owned include 122 on loan to other collections from the NYZS. There were 57 species listed as endangered, threatened, or vulnerable. Births and hatchings totaled 145.

Wildlife Survival Center

Lemurama

In May 1987, zoologists and wildlife administrators met at the Wildlife Survival Center for the second Lemur Workshop, hosted by NYZS and the St. Catherine's Island Foundation. Representing the lemurs' homeland, the Malagasy Republic, were six government officials—including the minister of animal production, waters, and forests and the director of the National Zoo of Madagascar—who initiated a protocol that was drafted by the group to guide further field research and animal collection for captive propagation. This important document—*A Convention for Collaboration*—serves as a clear statement of determination by the government to preserve Malagasy's unique and rapidly diminishing natural heritage.

The Wildlife Survival Center, with its captive breeding and release programs, has played a key role in this conservation effort for several years. Last year, eleven births were recorded among the Center's six varieties of lemur. Five of these occurred in the two troops of Bronx Zoo-born ring-tailed lemurs that were released on the island's north end in June 1985 and November 1986, and that now comprise the only free-ranging population of the species outside Madagascar. All the animals in this release project have acclimated well to the environment and to each other. Leaps of twenty to thirty feet in live oak canopies over sixty feet high are a common sight, and food supplementation is minimal. From acorns to zinnias, the lemurs make full use of the island's native flora. Experience gained here will eventually help in reintroducing lemurs in their native forests.

Strengthening genetic diversity

In consultation with studbook keepers and zoo curators, and for the purpose of ensuring genetic diversity in certain mammal species, unrelated males were acquired and introduced in the herds of Grevy's zebra, slender-horned gazelle, and sable antelope, as well as the group of six female Parma wallabies. Births were recorded in these species and in most of the antelope forms.

Expanded bird programs

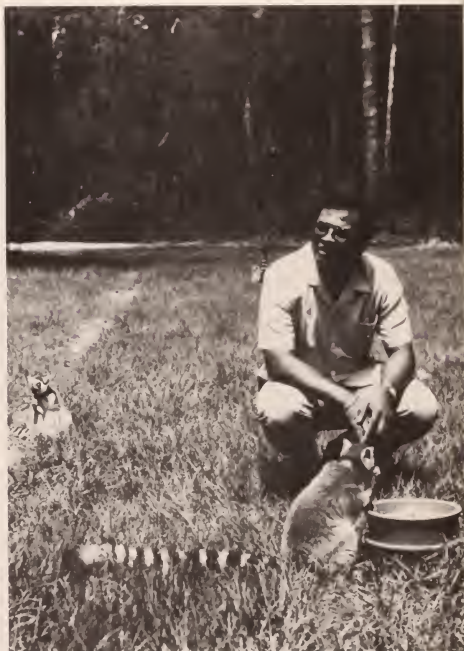
In October 1986, biologists attending the Stork Working Group on St. Catherine's discussed a wide range of topics concerning the natural history of storks, problems facing populations in the wild, the significance of captive breeding in the survival of endangered forms, and the worldwide coordination of stork breeding and research. The meetings were particularly helpful to the Center's staff as it prepared for the arrival of three pairs of saddle-billed storks in April 1987 to establish a breeding program that may later

be expanded to encompass other storks and their taxonomic allies.

Great curassows were brought to the island in 1981 as a pilot breeding group for highly endangered and little known cracids of South America, which are also now being studied by WCI Research Associate Stuart Strahl in Venezuela. There are now five curassow species at the Center, all of which produced eggs during the last year. Three black curassow hatchlings in May were the first for this species.

Other bird breeding

With Florida sandhill cranes now firmly established on the island through a release program begun four years ago, the first nesting and breeding activity in the group was observed during the spring. A pair of two-year-old cranes, though too young to be successful, did establish a territory and produce two eggs in one of the antelope yards. The eggs were lost to pre-



Officials from the Malagasy Republic observed the WSC release program for ring-tailed lemurs while attending the second Lemur Workshop.

dation, but as the pair matures they should be able to produce fertile eggs and to defend the nest more vigorously. An intern has been assigned to monitor the release group for the purpose of assessing the program's success.

The highlight of parrot breeding involved the hatching and first successful hand-rearing of two palm cockatoos, as reported elsewhere (Ornithology, p. 17). Also for the first time, at least at the Center, Pesquet's parrot chicks were successfully reared by their parents, rather than keepers, in the palm log nest where the adults have laid eggs for eight years. Once extraordinary but now common hatchings included those for red-fronted macaws and leadbeaters cockatoos.

500 tortoise eggs

Since the tortoise breeding programs began at the Wildlife Survival Center in 1978, four species have shared the task of producing some 500 eggs. Prominent among them has been the endangered radiated tortoise of Madagascar, which added sixteen hatchings to its nine-year total of seventy-six. Most of the hatchlings have been sent to zoos as exhibit animals and will become active members of breeding groups when they mature, in anywhere from fifteen to twenty-five years.

Three clutches of eggs laid by the angulated tortoise, the most endangered of all tortoise species, were collected for artificial incubation and, hopefully, the first successful hatchings. The Center's one male and two females are three of only five specimens outside Madagascar. This group, along with a group of seven recently set up for breeding in Madagascar may be the last hope for this species.

Yellow-footed tortoises bred for the first time, producing two young. The species, which varies in size throughout the rain forests of South America, has suffered greatly from the pet trade, with exported animals measured in tons. The daily destruction of their forest habitat is now the biggest threat to these and all other South American forest dwellers.

Staff changes

Wendy Turner was named Assistant Curator of Ornithology, former Zoological Technician Steve Balzano filled her vacated position as Aviculturist, and James Tamarack, a wildlife biologist formerly of the Atlanta Zoo and Lion Country Safari, was appointed Zoologist. Internships were held by Barbara Burke of Cornell University, Elizabeth Berkeley of Hiram College, and Glenna Stewart of McGill University.

Wildlife Survival Center Census (as of December 31, 1986)

	Families	Species and subspecies	Specimens at Center	Specimens owned
Mammalia orders				
Marsupialia—Wallabies	1	1	10	13
Primates—Lemurs	1	6	35	21
Perissodactyla—Zebras	1	1	6	4
Artiodactyla—Antelope	1	6	77	69
Totals	4	14	128	107
Aves orders				
Anseriformes—Screamers, geese	1	1	2	2
Galliformes—Pheasants	2	6	18	17
Gruiformes—Cranes, bustards	2	7	44	58
Columbiformes—Pigeons	0	0	0	1
Psittaciformes—Parrots	1	6	36	42
Coraciiformes—Hornbills	1	4	26	21
Totals	7	24	126	141
Reptilia orders				
Chelonina—Turtles	1	3	65	42

N.B. Specimens at Center included 67 on loan from other collections. Specimens owned included 43 on loan to other collections from the NYZS. There were 35 species listed as endangered, threatened, or vulnerable. Births and hatchings totaled 112.

Animal Health

Clinical review

As part of the department's comprehensive preventive medicine program, well over 1,000 animals at the Bronx Zoo and New York Aquarium were examined during the year for conditions encompassing the entire spectrum of bacterial, parasitic, and viral diseases.

This regimen of quarantine, vaccination, and diagnostic testing undergoes constant change as advances are made in both zoological and human medicine. Employed recently were tests, adapted for use with animals, that were designed to identify a new group of viruses related to and including human AIDS and leukemia. Fortunately, the tests were negative for primates in the Zoo's collection.

Also introduced was a new technique, called "evoked auditory brainstem response and impedance," for testing hearing loss in a diverse group of animals. Keepers had reported that a sea lion at the Aquarium and a gorilla at the Zoo were displaying signs of deafness. Since wild animals do not usually respond to verbal signals, it was decided to use an electroencephalogram, which measures receptivity to sounds of varying intensity and can pinpoint defective areas from the eardrum to the brain. The keepers' observations proved correct. The sea lion had developed a severe

hearing loss due to bacterial infection in the brain, which had been otherwise successfully treated. A viral disease was suspected in the gorilla's case. A caiman and a Texas pigeon were also tested to demonstrate that the technique can be used with different classes of animals; both appeared to have normal hearing.

Routine fecal monitoring procedures turned up a new species of malarial parasite in young hooded cranes. Using a therapy schedule that has been successful with other forms of avian malaria, it was possible to eliminate the organism before a severe disease process could set in.

Reproduction research

In the Society's cooperative research program with the Population Council, infertility in captive gorillas remained a major focus of Dr. Minu Chaudhuri's endocrinological studies. Examining twelve female gorillas from the Bronx and other zoos, Dr. Chaudhuri was able to determine imperfections in their monthly cycles and to begin devising remedies. Subsequent studies will further concentrate on methods of improving defective reproductive cycles in gorillas with drugs and other therapies and therefore enhancing their chances of producing offspring in the future.



Dr. Robert Cook and assistants perform a dolphin endoscopy at the Aquarium.

This in turn will increase the viability of captive breeding programs for the species, which have been severely handicapped in recent years.

Male gorillas were also studied by Dr. Chaudhuri, and for the first time seasonal changes were noted in their testosterone levels. The variations may not be a matter of fertility but rather of sexual drive, resulting in a periodic pattern of breeding among male gorillas. This might allow less dominant males in a troop to breed at times when their own testosterone levels were high. Dr. Chaudhuri has noticed the same seasonal hormone changes in male ferrets and cranes.

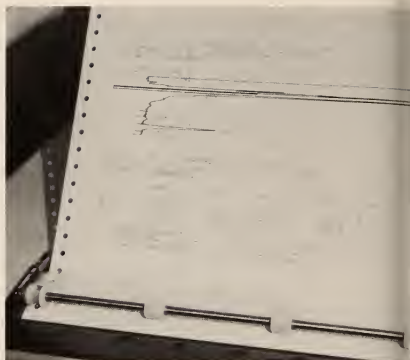
Another testosterone project, undertaken in conjunction with Joshua Ginsberg of Princeton University, investigated aggressive behavior in zebra stallions. It was determined that males protecting mares and territory had higher testosterone levels than bachelor males. Questions to be answered in future studies include whether single males will become more territorial when given testosterone, and whether the presence of females increases levels of the hormone in males.

Nutrition research

Begun only last year, the department's nutrition program has made significant strides under Dr. Ellen Dierenfeld. Ongoing vitamin E studies, underwritten by Hoffmann-La Roche, Inc., encompassed both captive and wild animals, with the help of WCI and other researchers in the field. More than 2,000 blood samples were analyzed, including several from free-ranging black rhinos in Kenya, mountain gorillas in Rwanda, and peregrine falcons in Utah. Specific vitamin E requirements for different species can now be identified through such comparative studies.

It appears from these studies that dietary habits, such as grazing or browsing, play a significant role in determining an animal's need for vitamin E. Free-ranging animals show vitamin E blood levels up to ten times higher than their captive counterparts, primarily because they eat living plants rather than dried and processed feeds. Zoo diets are now being altered in accordance with these findings, and research is being expanded to encompass a much broader range of species.

To this end, the Nutrition lab's equipment and capability in analyzing feeds and samples sent in by field scientists have been improved considerably. Feeding trials, requiring the exact measurement of what an animal eats, have been instituted at the Zoo, and nutritional analyses have been carried out in the field on such animals as the proboscis monkey and the okapi.



Vitamin E levels have been recorded on computer printouts for 183 species at the Zoo, including the endangered pudu, a tiny South American deer.

The review of all diets in the Zoo is being conducted with the help of a computer program designed specifically for animals. Primary considerations include nutritional content, the animals' responses to various foods, and cost.

Staff activities

An important NYZS effort was headed by Chief Veterinarian Emil Dolensek, who chaired a new committee on keeper safety and training. The committee established a six-month orientation and training program, with sessions on animal management and keeper safety conducted by curatorial, Animal Health, and other departmental staff. By year's end, eight keepers had graduated from the course. In a related matter, Associate Veterinarian Janet Stover was developing a program in cardio-pulmonary resuscitation that will be offered to all Society staff.

Clinical Resident Dr. Robert Cook has been primarily responsible for the care and treatment of aquatic animals at the New York Aquarium, and has further developed the Animal Health Center's computerized medical record system. While carrying out her regular duties, Pathology Resident Dr. Tracey McNamara has also been involved in training WCI field biologists in collecting pathology data. Generous support for this program has been provided by NYZS Advisor Mrs. Shirley Katzenbach.

Zoo Education

Last year, the Education Department served more than a million and a half people at the Bronx Zoo through the Children's Zoo, wildlife classes at every level, guided tours on the Bengali Express monorail and Safari Tour Train, animal presentations at the Wildlife and Children's theaters, camel rides in Wild Asia Plaza, and the volunteer activities of the Friends of the Zoo. But the department's efforts reach well beyond the Zoo as well, to school systems throughout the New York area, to children and adults in the fifty states, and to nations where wildlife conservation is given some priority. Recent developments reflect these expanding interests.

Teachers near and far

With funding from the National Science Foundation, the department launched a new program of training and curriculum development for secondary school science teachers in the tri-state metropolitan area. Zoos for Effective Science Teaching (Z.E.S.T.) was designed to encourage the use of the Zoo in teaching biology, chemistry, physics, earth sciences, psychology, and other disciplines, to maximize the impact of wildlife education in the community, and to strengthen the bond between the Zoo and local educators.

Z.E.S.T. teacher training began in January, when thirty science educators gathered at the Zoo for a series of eight full-day workshops. Education staff members presented science activities and materials dealing with such subjects as optics of the vertebrate eye, the social behavior of primates, and the mechanics of animal muscles at work. Concluding in March, the participating teachers began to prepare their own original lesson units using the Zoo as their resource. The fall follow-up phase called for a conference of all participants at the Zoo and the editing of teachers' lesson plans by Education staff for a manual on the effective use of the Zoo.

In part, the Z.E.S.T. program came out of the highly successful Summer Seminars for Teachers, held in the summer of 1986 with support from the Geraldine E. Dodge Foundation and the Moore Foundation. In two weeks of intensive instruction at the Bronx Zoo, fifty-five teachers from eleven states, Canada, and Belize learned about the use of living collections in science education. The exchange of ideas and experience with Belizean teachers, who have been working with the department's *Wildlife Inquiry Through Zoo Education* (W.I.Z.E.) in their own schools, was particularly valuable.

Instructor Patrick Jodice led classes in the new Headstart-in-Science program.





In Zoos for Effective Science Teaching (Z.E.S.T.) seminars, educators learn how to use such exhibitions as *JungleWorld* for teaching.

Zoo Education abroad

Since 1985, the department has worked with the Society's conservation division, Wildlife Conservation International (WCI), to foster education programs in areas where the Society supports conservation projects. A pilot program was begun in the primary schools of Belize, where the first module of W.I.Z.E.—*Diversity of Lifestyles*—was introduced in 1986. During a mid-June 1987 visit to Belize, Bronx Zoo project staff found that the program was still used effectively by many of the original participants. Tentative plans were made with the Ministry of Education to hold a second training workshop for a new group of teachers. In addition, the Belize Teachers College invited Bronx Zoo Education staff to offer student teacher workshops on the use of W.I.Z.E.

On another front, methods for promoting education in the schools of Sierra Leone were explored with WCI Research Fellow and primatologist John Oates. The department explored further links with international conservation projects by surveying WCI's principal field investigators. Their response was enthusiastic, and they strongly emphasized the need for materials that would help people understand the interdependence of economic development and ecological preservation.

More on W.I.Z.E.

Complementing its several awards from the zoo, education, and government communities, W.I.Z.E. has now been made eligible by the National Diffusion Network, an arm of the U.S. Department of Education, for Federal support to disseminate the publication throughout the country. W.I.Z.E. is one of only a few national curriculum programs selected for possible funding, following an intense scrutiny by educators on the Joint Dissemination Review Panel, a body that advises the U.S. Office of Education on educational programs of excellence.

To date, W.I.Z.E. has reached about 50,000 sixth-through twelfth-grade students in the United States, as well as the many teachers who have attended W.I.Z.E. workshops, as described above.

School programs

With funding from the New York State Council on the Arts (NYSCA), the department initiated "Head-start-in-Science" at the Bronx Zoo in cooperation with New York City's Gifted Network. Newly created activities involving textures, patterns, shapes, colors, sounds, senses, numbers, and animal tools were tested by 250 youngsters in grades K-2 from the Bronx, Manhattan, Brooklyn, and Queens. Teacher training and a series of six workbooks were to become part of this pilot program in the 1987-88 school year.

Funding was also provided by NYSCA for "Jungle Exploration," conducted in collaboration with the Bronx High School of Science. About 350 gifted, underprivileged adolescents from school districts in the Bronx and Manhattan attended these three-hour sessions in the Zoo's *JungleWorld*.

Classes for six different age groups, from kindergarten through twelfth grade, were offered to 24,017 students in organized groups during the year. The Zoo was visited by 342,095 students in class and camp groups.

General audience programs

Classes offered to the general public attracted 3,021 adults and children of all ages. Several new program stressing international conservation featured NYZS scientists. Martha Munn reported her latest findings on the behavior and ecology of giant otters from Peru Manu National Park. Mammalogist Dr. Michael Hutchins discussed the unique wildlife of Australia while Dr. Clifford Rice explored India's richest wildlife area. Other new classes for adults included "Is Evolution Endangered?," "Cold Capers," "Territorial Rites," "Playtime," "World Jungle Update," "Zoo

"Celebrities," "Eggs," and "Bears! Oh My!"

The visit of giant pandas to the Zoo from China inspired appropriate educational responses. Dr. Ellen Dierenfeld, the Zoo's nutritionist, starred the panda in her lecture on diet and digestive physiology in zoo animals. This spring's "ZooLab: A Family Discovery Center," which drew some 1,500 family members over eleven successive Saturdays, focused on the courtship and mating behavior, life cycle, and diet of the giant panda.

New family courses were devoted to the Zoo's oldest and newest outdoor habitat exhibits. "Safari to Africa" took participants, armed with binoculars, to the African Plains for a closeup view of giraffes, gorillas, lions, zebras, and other species from the great savanna wildlife spectacles. The recently opened Himalayan Highlands was the setting for "Himalayan Festival," which presented snow leopards in the context of Tibetan culture. This exhibit

also helped Zoo Club members learn about vanishing animals in remote areas.

Sound and sight

The department's audio-visual productions during the year included two movies for widely different audiences. *Snakebite Protocol at the Bronx Zoo*, made in collaboration with the Herpetology Department, is the first in a projected series of professional training films on animal handling and veterinary medicine for use at NYZS facilities. A narrated film, *90 Years: The New York Aquarium*, brought together old footage and photographs for the members' annual meeting in February.

Film from the Society's archives was also used in a "video press release" concerning the history of pandas at the Bronx Zoo. In June, the department installed a Project W.I.Z.E. exhibit and videotape in the United Nations as part of an exhibition celebrating Environment Awareness Week.



The outreach program run by long-time FOZ member Harriet Krasnoff (left) brought Bronx Zoo animals to eighty-three health care facilities in the New York area.

The Children's Zoo, animal rides, and theater presentations

Attendance at the Children's Zoo reached 660,834 children and adults, many of whom also attended the special lectures in the Children's Theater. In Wild Asia Plaza, free animal demonstrations at the Wildlife Theater continued to attract thousands of visitors each day during the season, and camel rides, with the help of four new animals, were enjoyed by 75,943 people.

Friends of the Zoo

The Zoo's education volunteers, Friends of the Zoo, wearing distinctive red aprons, played an important

role in the Zoo's presentation of giant pandas. Stationed at and around the exhibition, they both worked with a prepared script and answered the questions of thousands of visitors.

Meanwhile, FOZ members gave guided tours to 14,704 visitors, worked 6,000 hours in the Children's Zoo, assisted department instructors in programs, answered letters from hundreds of school children, and conducted forty-five birthday parties. Several volunteers assisted at the Animal Health Center, and others visited eighty-three health care facilities as part of the Outreach Program.

Children's Zoo Animal Census, Bronx Zoo (as of December 31, 1986)

	Families	Species and subspecies	Specimens at Zoo	Specimens owned
Mammalia orders				
Insectivora—Hedgehogs	2	2	5	5
Edentata—Armadillos	1	1	1	1
Lagomorpha—Rabbits	1	2	38	38
Rodentia—Mice, porcupines, etc.	4	7	18	18
Carnivora—Foxes, ferrets	4	6	24	24
Perissodactyla—Horses	1	2	5	4
Artiodactyla—Goats, sheep, camels, etc.	2	5	38	37
Totals	15	25	129	127
Aves orders				
Ciconiiformes—Hérons	1	3	4	4
Anseriformes—Ducks, geese	1	8	76	76
Falconiformes—Falcons	1	1	4	4
Galliformes—Chickens	1	3	36	36
Columbiformes—Doves	1	2	4	4
Psittaciformes—Parrots	1	6	7	4
Strigiformes—Owls	2	3	6	6
Caprimulgiformes—Frogmouths	1	1	1	1
Passeriformes—Perching birds	1	1	1	1
Totals	10	28	139	136
Amphibia orders				
Caudata—Salamanders	1	2	11	11
Anura—Frogs, toads	3	3	16	16
Totals	4	5	27	27
Reptilia orders				
Chelonina—Turtles	3	9	38	38
Crocodylia—Alligators	1	1	5	3
Squamata (Sauria)—Lizards	2	4	8	8
Squamata (Serpentes)—Snakes	2	7	17	17
Totals	8	21	68	66

N.B. Specimens in Zoo include 4 on loan to NYZS from other collections. There were 25 species listed as endangered, threatened, or vulnerable. Births totaled 2.

Exhibition and Graphic Arts

Mountain and marsh

After three years of planning, design, construction, and landscaping, largely by NYZS staff, Himalayan Highlands opened to the public on September 26, 1986. Focusing on snow leopards and white-naped cranes, two endangered species for which the Society has established important long-term breeding programs, the exhibition was designed to immerse the zoogoer in the animals' environment—a marsh for cranes, tree-tops for red pandas, a forested thicket for Temminck's tragopans, and distinct but interconnected mountain, cave, and grassy areas for snow leopards.

The main part of the exhibition re-creates a Himalayan landscape of rocky talus slopes, great boulders, rushing streams, and dense stands of bamboo and fir, punctuated by sunny alpine meadows. Careful attention to site planning and the inclusion of prayer stones, prayer flags, Nepalese structures and painted decor, and plants indigenous to the Himalayas establish a strong sense of place. But only with recently developed techniques of fabricating rock formations and containing exhibits with nearly invisible stainless steel mesh was it possible to achieve the effect of a common space for people and animals.

Complementing the exhibits are interpretive graphics stressing the importance of preserving snow leopards and cranes and the Society's role in that effort through breeding programs and WCI field research.

Giant panda festival

In the two months before giant pandas arrived from the Peoples Republic of China, the department took part in the Zoo-wide effort to renovate exhibition and public facilities for the six-month visit. In record time, the 1941 panda exhibit was readied, a festive entry processional with a welcoming red canopy was designed and built, dozens of giant hardy bamboos were planted in Chinese tubs, a special souvenir tent was raised, and ticket booths were constructed and installed. Bilingual graphics, interpretive signage, staff identification buttons, T-shirts, posters, banners, and visitor directional signs were developed around the oriental brushwork drawings of the department's Asian-trained Exhibit Foreman Hank Tusinski.

New, renewed, renewing

With fifteen tons of soil, faithfully reproduced termite mounds, and thickets of thorny acacia, the department created an arid South African habitat for a group of meerkats in the Carter Giraffe Building. These fascinating social mongooses burrow, climb, and interact with abandon in their specially heated and lighted piece of the Kalahari Desert.

The evolution of JungleWorld continued with a brief mid-winter closing for improvements, repairs, and an intensive housecleaning. Public spaces were repainted. A new filtration system converted the gharial river into a crystalline montane stream. Four more epoxy mangrove trees gave the expanding proboscis monkey population climbing space and helped support the existing trees. Parts of the forest were replanted and new graphics installed. Monkey House renovations included vivid new background murals for exhibits that for the most part are now occupied by various species of marmoset and tamarin.



Hank Tusinski re-creates one of his giant panda drawings on a large scale.

At the Aquarium, the Red Sea exhibit was fashioned as a cavernous array of coral and rock formations, and renovation of the Bermuda Triangle benefited from that experience. The African Rift and cuttlefish exhibits were also rebuilt, and prototypes were created to test interactive participatory devices for Discovery Cove. Major projects in graphic design were the panels for the new entranceway and the photographic retrospective that marked the Aquarium's ninetieth anniversary.

Planning, from the Bronx to Kenya

A number of projects were at various stages of planning: improvements at the Elk Range and Wildfowl Pond, an expanded cafeteria and souvenir area at the center of the Zoo, many schemes in conjunction with the Society-wide planning effort, and the soon-to-be started African Plaza and Plateau, which will give the old African zoogeographic zone a public orientation, education, and sales center as well as a unique high-altitude grassland exhibit devoted to Ethiopian wildlife, including gelada monkeys, Ethiopian ibex, hyrax, and various bird species.

A fascinating initiative overseas involves the possible renovation of Nairobi Park Orphanage for wildlife in Kenya. A feasibility study for the project, which would transform the Orphanage into an interpretive environmental center, began with an on-site visit by General Director William Conway and Deputy Director for Design John Gwynne.

Logo and other graphics

The search for a definitive institutional logogram was successfully concluded when the Board of Trustees adopted an image that seems to represent the broad range of NYZS interests and endeavors. The design incorporates a silhouetted pair of leaping impalas by the noted animal artist Ugo Mochi. The symbol will be used worldwide on all NYZS properties, from stationery and publications to uniforms and vehicles.

Departmental graphic designers created interpretive signage, animal labels, invitations, brochures, SSP study books, promotional and visitor literature, and other materials in the hundreds for all NYZS divisions. In addition to special exhibition projects, there were new parking lot graphics for visitor orientation at the Bronx Zoo and new directional signs and street banners at the Aquarium.

Special Honors

The Society received three significant design awards during the year. The American Association of Zoological Parks and Aquariums named *JungleWorld* as the best zoo exhibition of 1986. *Print Casebooks*

published *JungleWorld* in the annual "Best of Graphic Design" competition. And Mayor Koch and New York City's Art Commission presented the Society with a Special Recognition Award "for an outstanding design and planning program."

Horticulture

Asian flora has been dominating much of the department's recent exhibition work. Some forty species of new plants, many of Asian origin, went into the new Himalayan Highlands, including red and white primroses, blood-red "Francesca" rhododendrons, and silver-green deodar cedars. It is interesting that many of the trees, shrubs, and herbaceous perennials are indigenous to both the Himalayas and the eastern United States.

Bamboo was the persistent botanical theme accompanying the giant pandas' visit. Bamboo clumps were planted around the exhibit, along with a Chinese-style rock garden. Thirty-foot potted bamboo, contributed by generous donors in the New York area, lined the visitor areas. And for the pandas themselves, a source was finally found in Savannah, Georgia, that could ship the nearly 200 pounds of bamboo required each week to feed them. Sixteen species of hardy bamboo were also planted on Zoo grounds as aesthetic accents and to be used in the future for browse.

In *JungleWorld*, the imposing collection of Asian plants was refurbished and added to, with such species as a rare aroid. Thenbergia vines and ficus trees have been growing so rapidly that they are periodically trimmed. And the interaction between plants and animals—gibbons swinging from tree to tree, or bar-bets excavating nest cavities—remains one of the exhibition's unique qualities.

To help preserve the Zoo's 150-year-old oak and sweet gum forest, an Integrated Pest Management Program has been developed and instituted with support from the Norcross Wildlife Foundation. IPM training will help horticulture staff to identify and deal with pest problems before they cause major damage. The computerized inventory of the Zoo's tree has been expanded so that a more systematic approach can be taken to reducing the stress that affects about half of the trees.

Phase I of the Plant Nursery and Browse Production Center construction has been completed. The new facility will produce exhibition and ground planting that cannot be obtained commercially and will serve as a commissary for willow, mulberry, grape, thornless blackberry, and other leaves to supplement the diets of animals throughout the Zoo.

Operations—Construction and Maintenance

Cogeneration and District Heating

A project that will renew and transform the Bronx Zoo's energy plant and distribution system was finally approved for construction by the City of New York and the Federal government's Urban Development Action Grant program in December 1986. By the end of the fiscal year, more than 5,000 linear feet of underground electrical conduit had been laid, and the generator plant building, located just south of JungleWorld, was forty percent complete. The generators themselves—dual-fueled diesel prime movers—were scheduled for fall delivery and system start-up and testing for spring 1988. This innovative new system, funded by the City, the Society, and a Federal grant, will supply all the Zoo's electrical energy and sixty percent of its thermal energy with far greater efficiency and reliability than has been possible before.

Phase I of the related Energy Conservation Project, financed by the City, was ninety-nine percent complete. Phase IIA was underway, with a new boiler being installed in the Reptile House and new conservatory glass and clerestory windows in the Great Apes House. Bidding for Phase IIB on window replacement in the Administration Building and conversion from a steam to a hot water heating system in the Great Apes House was about to begin.

In smaller projects, the City also provided support for a replacement electrical transformer and two diesel engine dump trucks for the Maintenance Department.

Bronx Zoo exhibitions

Outside contractors and Society staff combined their talents to complete the rugged and colorful Himalayan Highlands for its official opening on September 26, 1986. A realistic habitat and extensive animal management facilities were provided for snow leopards, red pandas, white-naped cranes, and tragopans.

In less than two months, the original giant panda exhibit of 1941, near the Great Apes House, was completely refurbished for the six-month visit of two pandas from China, which began in late April. The terraced public viewing area was modified to handle the expected large crowds of visitors; temporary electrical service was installed for all visitor facilities; a colorful canopy was created over the entrance walkway; and a large souvenir tent and ticket booths were erected.

The Elephant House-Zoo Center renovation, with City and Society funding, moved toward the completion of its first phase in October 1987. This included structural rehabilitation, the replacement of antiquated mechanical systems, and the creation of new interior exhibit spaces for elephants and rhinos, interpretive gallery areas, a Zoo information desk under the dome, and other public amenities. Contractor default has delayed Phase II—the construction and landscaping of outdoor exhibits—but the City's Department of General Services was conducting negotiations in order to complete the job as quickly as possible. When that is accomplished, Phase III—the Animal Behavior Theater on the building's south side—will begin.

Renovation around the Zoo

Some smaller projects by in-house staff included the rehabilitation of animal management facilities in South America and in the Monkey House. The installation of a sand filter in the gharial pools was one of the modifications made in JungleWorld, and roof repairs were completed at the Nyala Barn and the African Plains Lion House.

Contractors were well underway with the renewal of the old animal hospital as office headquarters for the Mammalogy Department.



Map of the Cogeneration and District Heating System under construction at the Bronx Zoo.



New York Aquarium

Ninety years later

Celebrating its ninetieth anniversary and its thirtieth year in Brooklyn, the Aquarium attracted 706,987 visitors during the year, exceeding 700,000 for the first time since 1972. Attendance has now risen more than seventy percent over the past seven years.

The Aquarium's birthday was observed on December 10, 1986, with the unveiling of a photographic retrospective in the Main Gallery titled "From the Battery to the Bronx to Brooklyn." Highlights from ninety years of aquatic exhibition, research, and education included this country's first look at beluga whales in 1897, the great blue lobster of 1917, William Beebe's famous dive of 1934, the Aquarium at the World's Fair of 1939, and the inauguration of the new Aquarium in Coney Island in 1957. Most of this material was also used in a narrated cinematic version, which incorporated archival film footage as well and was shown at the NYZS members' annual meeting in February 1987.

The anniversary was marked by another opening, for the new Red Sea exhibition. Here, the spectacular vertical reefs of the Red Sea were recreated by in-house staff using fiberglass casting techniques. Winding tunnels and intricate rock formations provide grazing grounds and escape routes for fishes of some nineteen species, including Picasso triggerfish, masked puffers, halfmoon angels, and moon wrasses.

Many of these beautiful and rare fish were collected during an expedition to the Red Sea by Curator Dr. Erwin Ernst, in cooperation with Conservation Education Diving Archaeology Museums International. Dives were made in the Gulf of Aqaba, the Tiran Straits, and Ra's Mahammad. The fish were then transported in insulated boxes up the coast of the Sinai Peninsula to the Elat Aquarium in Israel before shipment to New York.

Another new exhibition—"Big Star, Little Star"—juxtaposed the world's smallest seastar (*Patiriella paravivipara*) with its larger cousin, the giant seastar. First identified only ten years ago, these miniature creatures, measuring as little as one millimeter across, are found only under granite formations in the waters off southern Australia. They give birth to live young, whereas most seastars reproduce by broadcasting eggs and sperm into the water.

Collecting the rare and exotic

The tiny seastar was only one of several unusual sea creatures collected in the South Australian Basin by Trustee Nixon Griffis and Senior Keeper Ed Dols. Others were the weedy seadragon, with leafy skin

flaps that camouflage its long, compressed body in an algae environment, and the tasseled anglerfish, which projects from the top of its head a "fishing rod" to attract unsuspecting prey with a specialized lure resembling a worm.

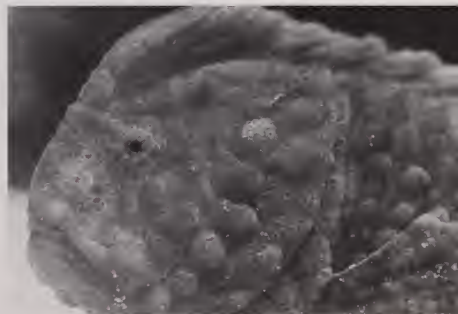
In an expedition along the Great Barrier Reef off northeast Australia, Aquarium Advisor Edwin Gould and Dr. Ernst collected moorish idols, leatherjacket filefish, and red-tailed damsels, among others. A four-day side trip to Osprey Reef in the Coral Sea brought in the unusual four-eyed goby. With the assistance of the Waikiki Aquarium in Hawaii, the fish were refreshed before making the final leg of the journey to New York.

Local trips in the Aquarium collecting boat *Tethys*, which was donated some years ago by Mr. Griffis, brought back plankton, lions' mane jellyfish, and a host of juvenile fish. Three species of pygmy sunfish, reported to be the smallest fish in the world, were collected off North Carolina. Other additions to the collection included two sandbar and two whitetip sharks, giant octopus, giant clams, spotted moray eels, spotted prawns, and queen conch.

Renovations and breeding

The fiberglass casting techniques used in the Red Sea exhibition were also put to work in renovating the Bermuda Triangle, with rock and coral formations fabricated to create a panoramic view of a tropical Atlantic reef habitat.

Renovations in the African Rift Lake exhibition were designed to improve lighting and encourage breeding. New plantings and rockwork were put in strategic areas to provide shelter for young hatchlings. Several successful spawnings of mouth-brood-



Shown for the first time at the Aquarium was the prow fish, collected by Trustee Nixon Griffis in the Gulf Saint Vincent near Adelaide, Australia.

ing cichlids have already taken place, and visitors are able to see young fish of varying sizes (and varying degrees of bravery) venture out from the rocks to investigate their habitat.

Pot-bellied seahorses have also been breeding successfully; the males carry and bear the young. There have also been births of desert gobies, camel shrimp, blind cave fish, clownfish, three stripe damselfish, and southern stingrays, as well as the usual hatchlings of black-footed penguins.

Animal training

New techniques developed by the Animal Training Department under head trainer Alysoun Seacat are directed to the veterinary care of marine mammals. Many behaviors, such as presenting flukes and flippers, are taught to the animals to facilitate medical examinations, including blowhole samplings in dolphins and whales and blood samplings. Beyond this, animals are being taught to accept a stomach tube so that samples can be taken without stress.

A few new non-medical tricks have been learned as well by dolphins Starkey and Lilly for this season's daily repertory in the Aquatheater. Showing unusual coordination, strength, and agility, both can now perform front and back flips and a tandem tail-walk.

Joining the performing sea lions during the winter were youngsters born at the Bronx and Flushing Meadows Park zoos. Both pups have acclimated well to their new surroundings, and one starred in the annual meeting. Because the other pup is deaf, the training staff had to develop new teaching techniques.

Capital projects

By the end of the year the building shell of Discovery Cove had been completed, and work on the interior exhibits, including walk-in environments, live animal displays, participatory devices, interpretive graphics, and audio-visual presentations, was about to begin. Entering through a covered outdoor focus area with a sandy bay shore, fishing dock, and



The weedy seadragon was another unusual species brought back from southern Australian waters.

full-scale fishing boat, visitors will explore three coastal habitats, the survival strategies employed by aquatic animals, and human uses of the sea's natural resources. The building will be a major public attraction and the Education Department's principal facility.

In the spring, the wall surrounding the Discovery Cove construction site was covered with large-scale paintings on aquatic themes by four artists. The Aquarium and the Brooklyn Arts Council (BACA) co-sponsored the exhibition, which opened at an evening reception attended by the press and local officials.

Plans for Sea Cliffs proceeded through a value engineering study sponsored by the City's Office of Management and Budget and involving representatives of various City agencies, the Aquarium, and outside consultants. The study arrived at the most efficient way to construct the project while providing the best facilities for exhibiting and breeding walrus, harbor seals, fur seals, sea otters, and black-footed penguins. The five major rocky shore habitats will be complemented by smaller indoor exhibits for prey species such as sea urchins, abalone, Pacific salmon, king crabs, lobster, octopus, and clams. Interactive areas will focus on how marine mammals and birds keep warm, how they swim and dive, and how they eat. The graphics will examine important conservation issues, including human competition for food resources and habitat destruction.

A tension structure and new graphic panels completed renovation of the Aquarium's entranceway. Visitors are now able to learn about the Aquarium's programs and NYZS activities while being sheltered under the huge all-weather canopy.

Aquarium Education

As Aquarium attendance soared, so did Education Department figures. Representing kindergarten through college, 240,777 students visited the Aquarium in 6,575 organized groups, an increase of seventy-five percent over last year. Seven hundred and thirteen classroom and on-site programs were conducted for 27,378 participants, including children, adults, and families. In addition, there were special workshops for graduate students, science teachers, seventy New York City bilingual teachers and para-professionals, and the Elementary School Science Association.

On weekends, the series titled "Beneath Noah's Ark" enrolled 2,044 people, including infants and



Extensive rockwork was fabricated during renovation of the Bermuda Triangle exhibit.

toddlers, in a program that stresses animal and artifact handling, music, art, physical activities, storytelling, role-playing, and games. Fish, invertebrates, penguins, and whales were the topics for these sessions, begun in 1985 and since expanded, which encourage interactions between parents and children.

For the second year, with refinements, the Aquarium conducted a unique cooperative effort involving a local junior high school and elementary school in District #21. In the Gallery Guide Program, students from junior high were trained by the Education staff over several months in the skills and techniques needed for teaching elementary school students. The experience culminated in a two-hour workshop in which the student-teachers guided



Close encounter with Clousseau, the black-footed penguin.

their younger charges through various activities, including squid dissection, fish printing, seaweed pressing, making plankton nets, examining artifacts, and investigating microscopic life.

As a teaching tool and a means of developing positive self-images for the older students and role models for the younger ones, the Gallery Guide Program has been highly effective. Several students were so motivated by their experience that they will resume their roles as interpreters in the Education Department's Docent Program. State and City observers enthusiastically endorsed the Gallery Guide

approach. The program will continue with funding from the New York State Anti-Drug Program.

New York City high schools, both public and private, provided twenty-five volunteers for the Docent Program. Stationed at ten major exhibits, these marine biology students, trained by the Education staff, gave on-site lectures, answered questions, and served as good-will ambassadors to over a quarter a million visitors. Serving as an intern in the Education Department throughout the year, Daniel Dziadura, a major in environmental studies at St.

John's University, was awarded the Exxon Grant for the summer of 1987.

A form of recognition for the Education Department came from the Canadian Broadcasting Company, which filmed a segment of their popular educational program, "The Nature of Things," at the Aquarium.

With Curator Karen Hensel and Instructor Ellie Fries featured, Education staff guided several family groups in a variety of activities for the television cameras, from seining and scavenger hunts on the beach to Aquarium tours, seafood cooking, art, and microscopy.

New York Aquarium Census (as of June 30, 1987)

Phylum	Class	Order	Species	Specimens
Chordata	Chondrichthyes—Cartilaginous fishes: Sharks, rays, chimeras	Heterodontiformes—Horn sharks	1	4
		Squaliformes—Typical sharks: Sand tigers, lemons	7	13
		Rajiformes—Rays	2	7
	Osteichthyes—Bony fishes	Acipenseriformes—Sturgeon, paddlefish	2	13
		Semionotiformes—Garfish	1	8
		Amiiformes—Bowfin	1	6
		Elopiformes—Tarpon, bonefish	1	4
		Anguilliformes—Eels, morays	8	14
		Salmoniformes—Trouts	2	26
		Cypriniformes—Minnows, carp	1	12
		Siluriformes—Freshwater catfish	1	5
		Batrachoidiformes—Toadfishes	1	35
		Atheriniformes—Platys, swordtails, killifish	2	100
		Beryciformes—Squirrelfishes	6	25
		Gasterosteiformes—Seahorses, pipefish	4	45
		Perciformes—Perches, sea basses, porgies, cichlids	150	800
		Pleuronectiformes—Flatfishes	4	35
		Tetraodontiformes—Puffers, boxfish, triggerfish	10	65
		Dipnoi—Lungfishes (South American)	1	3
		Reptilia	Chelonia—Sea turtles	5
	Aves	Sphenisciformes—Penguins	1	52
	Mammalia	Pinnipedia—Seals, sea lions, walrus	3	17
		Cetacea—Whales, dolphins	2	7
Cnidaria	Anthozoa—Corals, anemones	30	numerous	
Annelida	Polychaeta—Marine worms	10	70	
Arthropoda	Crustacea—Lobsters, shrimps, crabs, isopods, etc.	16	200	
	Arichnida—Horseshoe crabs	1	30	
Mollusca	Gastropoda—Snails	3	200	
	Pelecypoda—Bi-valves	2	400	
Echino-dermata	Cephalopoda—Octopus, nautilus	3	41	
	Asteroidea—Starfish	13	200	
	Holothuroidea—Sea cucumbers	5	20	
	Echinoidea—Sea urchins	5	100	
	Totals		304	2,577 +

Osborn Laboratories of Marine Sciences



Humans and dolphins communicate despite divergent brain structures.

Sea Smarts

Whereas most studies of whale and dolphin intelligence have concentrated on the communicative powers of these marine mammals, research being conducted at OLMS by Dr. Myron Jacobs of New York University, Dr. Ilya Glezer of the City University of New York, and Dr. Peter J. Morgane of the Worcester Foundation for Experimental Biology, has focused on brain structure. What the scientists have found to date, employing more sophisticated analytical techniques than have been tried before, indicates that whale and dolphin brains are both "primitive" on the evolutionary scale and "advanced" in terms of marine intelligence.

That is, the organization of the brain's circuitry is relatively simple, like that of an early archetypal mammal, and therefore may offer clues to evolutionary development. But the cortex itself is large and thus capable of processing a quantity of information and responses, the astute behavior with which we are familiar. On this and other evidence it is deemed unlikely that dolphins and whales would be capable of language in the human mode. Rather, their intelligence has evolved in response to the particular demands of a marine environment on sensory systems.

Last of a species

During a recent trip to Mexico, Fish Geneticist Dr. Klaus Kallman discovered that the Monterrey platyfish (*Xiphophorus couchianus*), a species he has been using in research since 1962, through forty-two generations has become extinct in nature. OLMS, therefore, now has the only population of the species in existence. Because Monterrey platyfish naturally inbred in the wild, the OLMS group has flourished and is well suited to genetic and biomedical studies.

X. couchianus once inhabited four small springs and river near Monterrey, but like other species of fish in desert regions, it succumbed to urban sprawl and overexploitation of limited water resources. One related population, perhaps a new species, has survived only because it inhabits a small spring that has been set aside as a recreational area. Further exploration in the canyons and mountains of Coahuila province, north west of Monterrey, may reveal additional species.

Threatened grass shrimp

It is general knowledge that hydrocarbon pollution from the discharge of gas and diesel fuels is harmful to marine life. Specific evidence of the negative effect has been adduced in a research project conducted by Constantine D. Kontras, one of several students for Stuyvesant High School in Manhattan taking part in the OLMS summer intern program under the direction of Pathology Lab staff.

Kontras' research concerned the grass shrimp (*Palaemonetes vulgaris*), which lives and breeds around pier estuaries, and marinas along the eastern seaboard of the United States. The species is an important link in the food chain, and its decline is bound to affect the survival of other marine species, in which case pollution control measures would be called for.

Focusing on a marina environment, where the shrimp would be exposed to a high concentration of hydrocarbons, the study compared the development of two groups of larvae, one hatched in the unpolluted water, the other in clean sea water. It was determined after daily observation for the length of the summer breeding season, that the polluted larvae survived at a rate of 10.6 percent, while the unpolluted larvae survived at 51.7 percent. Pictures magnifying the larvae 2525 times on the lab's electron microscope and 2 times on a light microscope were inconclusive in showing developmental defects, but this is an area for further inquiry.

With this project, Kontras was a semi-finalist in the Westinghouse Science and Talent Search and in the St. John's University Science Fair, and a finalist in the Otto P. Burgdoff Science Conference.

City Zoos Project

Central Park Zoo

As summer 1987 began, the zoo neared its final form. The great colonnade around the Central Garden was being roofed with trellis and glass to create an all-weather walkway. Realistic murals were underway to complete the illusion of a dense, moist rain forest in the Tropic Zone Building, where giant artificial trees, linked by sinewy vines, had already been placed and finished in fine detail. The Edge of the Icepack building had been completed in early spring and its complex mechanical life-support systems, designed to re-create the climatic conditions of Antarctica and the Arctic, were being tested. Rockwork already defined the coastal habitats of the polar bear, harbor seal, and Arctic fox, and the lake island to be inhabited by Japanese snow monkeys in the Temperate Territory. The Heckscher Zoo School, with its auditorium and classrooms, was practically ready for use, and the Society's public space for promoting international conservation, the Wildlife Conservation Center, was being planned.

By spring, most of the buildings had received their temporary certificates of occupancy from City inspectors, a final step before equipment and furnishings are moved in. Renovation of the old Arsenal building's first floor, which will house the zoo's administrative staff, was scheduled for completion by fall. Meanwhile, arrangements were being made to fill these buildings and environments with people and animals. To the modest staff of four will be added keepers, teachers, maintainers, and a host of other personnel. The animals will come from a wide variety of sources. Chin-

strap and gentoo penguins and tufted puffins, for instance, have been acquired in a unique cooperative effort between the Society and Sea World of Southern California. Penguins for Central Park were collected in the Antarctic by the Sea World staff in December. Puffins were collected on an NYZS-led trip to Alaska for the Central Park and Bronx zoos, the Como Zoo in St. Paul, Minnesota, the Lincoln Park Zoo in Chicago, and Sea World facilities in San Diego, California; Orlando, Florida; and Aurora, Ohio.

Prospect Park Zoo

With the completion of refinements in exhibition design resulting from last year's Value Engineering Study, the zoo is scheduled to close in spring 1988 in preparation for the start of construction in the fall. The City's Percent for Art Program has commissioned artist Mags Harries, well known for her public works in Boston and elsewhere, to create a major site-specific sculpture for the new zoo. The firm of David Manwarren, Inc., was hired to prepare exhibit drawings, and General Exhibits of Chicago, which filled a similar role for the Bronx Zoo's Children's Zoo, is developing a series of interpretive participatory devices.

Flushing Meadows Zoo

Recommendations made by the Value Engineering Study conducted early this year were being incorporated by architects and engineers in the final stage of design. The zoo was scheduled to close in fall 1987, and construction to begin in the spring, after arrangements have been made for housing the animals.

The great colonnade at the Central Park Zoo as seen from the snow monkeys' island.



\$5,000 REWARD

FOR PHOTOGRAPH OR INFORMATION

Which results in the Verification of one or more live Black-Footed Ferrets in Montana

DO
NOT
KILL
OR
TRAP!



Photos by Tim W. Clark

DO
NOT
KILL
OR
TRAP!

WANTED ALIVE

BLACK-FOOTED FERRETS AND THEIR LOCATIONS IN MONTANA

IDENTIFYING CHARACTERISTICS

The black-footed ferret (*Mustela nigripes*) is the size of a medium-sized mink, about 18 inches long and 2½ pounds. *Unique features* are a black face mask and black feet. Do not confuse it with a long-tailed weasel (no mask or black feet) or a domesticated ferret from a pet store. The black-footed ferret is usually found in or near prairie dog towns.

CONTACT

To make a report or to receive more information, contact your nearest regional office of the Montana Department of Fish, Wildlife and Parks, or call or write to:

Ferret Search
Montana Department of Fish, Wildlife & Parks
Box 5, Montana State University
Bozeman, Montana 59717
(406) 994-3285

Sponsored by the
Wildlife Conservation International
A Division of the New York Zoological Society

Administered by the
Montana Department of Fish, Wildlife
and Parks

In cooperation with the
Bureau of Land Management
US Fish and Wildlife Service
US Forest Service
Bureau of Indian Affairs
Montana Department of Agriculture

REWARD CONDITIONS

The black-footed ferret is an endangered species protected by very stringent federal and state laws. The reward WILL NOT be paid for any black-footed ferret intentionally harassed, trapped, or killed by the finder. The reward will be paid to the person who provides information leading to the discovery and verification of the existence of the first live black-footed ferret in Montana. Examples of information to supply include: (1) skins and skeletons of black-footed ferrets struck accidentally by cars and found along roads, (2) observations of black-footed ferrets reported on standard forms available from any district office of the Montana Department of Fish, Wildlife and Parks, or (3) photographs.

The reward will not be paid to someone who was on private lands illegally.

The reward is limited to Montana and will expire on October 1, 1988. In the event of a tie or a question concerning the awarding of the reward, the Montana Department of Fish, Wildlife and Parks will be the final judge. The Department may elect to have the reward shared by two or more individuals if warranted. The final burden of proof will be the responsibility of the person(s) making the report, including assisting with the verification.

INELIGIBILITY: Employees of the Montana Department of Fish, Wildlife and Parks and cooperators are ineligible for the reward.

Wildlife Conservation International

Most of what was continued and undertaken by Wildlife Conservation International scientists during the year reflected one or more of the three areas in which WCI has determined to dedicate its efforts in conservation biology.

The first involved field investigations conducted over a sufficient area and period of time to establish data that is useful to conservation planning. These include, for instance, major studies of okapi in Zaire, clouded leopards in Thailand, Nassau groupers in Belize, crocodiles in Venezuela, and a host of projects in which we hope to learn as much about the total ecosystem as individual endangered species.

Second, WCI has increasingly sought to train and engage conservation scientists and advocates in their own countries, primarily Third World nations, where they can have a lasting impact and influence on ecological and economic planning. This is apparent in a growing number of projects being undertaken with WCI support in Africa, Asia, and Latin America.

Third, WCI is concerned with helping in emergency situations, such as the demise of black rhinos in East Africa or the devastation of Borneo forest by

fire. These are the necessary but unwanted immediate actions that long-term programs hope to diminish.

As it moves toward the center of the Zoological Society's overall program, WCI is initiating and becoming part of many conservation activities involving the Bronx Zoo, the New York Aquarium, and other NYZS divisions. Included are cooperative efforts in education, nutritional research, pathology, captive breeding, and other areas in which the resources of the Society—particularly its professional staff of zoologists, veterinarians, animal managers, educators, and exhibition designers—can be effectively employed. Cooperation and communication in the conservation community and the world at large is equally important, and it is in that spirit that WCI organized its first international conference in the fall of 1986.

Conservation 2100

"World peace and protection of nature are related, interdependent goals. Both are possible if people are committed to humanitarian values—respect and love, compassion and tolerance for all forms of life."

With these words from His Holiness the Dalai Lama, *Conservation 2100: A Fairfield Osborn Sym-*

Dr. David Western inspects an aging boundary fence in Nairobi National Park that WCI funding will help to replace in support of Kenya's rhino survival program.





Dr. Patricia Moehlman has studied jackals in Tanzania's Ngorongoro Crater for twelve years.

posium was convened by Wildlife Conservation International at Rockefeller University in New York City on October 20, 1986. For four days, in ten successive sessions, some forty conservation leaders from around the world discussed the urgent problems and needs of conservation in the upcoming century. Conservation biologists, zoo and park managers, environmentalists, philosophers, sociologists, corporate representatives, and other participants presented and exchanged ideas on extinctions; populations, species, and evolution; ecosystems and biosystems; parks; ex-situ care and biotechnology; conservation beyond the parks; conservation and human values; conservation planning; and conservation and the developed world.

The conference concerned itself with how much and where to intervene on behalf of species and ecosystems in a world that is enduring, due to human overpopulation and development, its greatest extinction spasm in 65 million years. The role of education was stressed as crucial in the effort to make conservation a tangible concept and an important part of daily life for all people. Dr. David Western, WCI Resource Ecologist and organizer of the confer-

ence (with Administrator of Conservation Programs Dr. Mary Pearl), underlined this point in his closing remarks by quoting a Chinese proverb: "If you plan for this year, you plant rice. If you plan for ten years you plant trees. If you plan for 100 years, you educate men."

The proceedings of *Conservation 2100* are scheduled for publication in 1988 by Oxford University Press.

Southeast Asia

WCI's concerns in Asia have turned increasingly to tropical rain forests, which have been nearly obliterated by slash-and-burn agriculture and commercial logging. With projects over the past year in the forests of Indonesia, Thailand, Malaysia, the Philippines, Papua New Guinea, and Australia, WCI now has the most extensive presence in the area, working cooperatively with universities and decision-makers in government agencies, while helping to build local conservation organizations.

On the island of Borneo, Dr. Mark Leighton is conducting a comprehensive study of tropical ecology in the rain forests of West Kalimantan, focusing on

the fig tree and all the vertebrates that depend on its fruit. While learning the dynamics of forest species distribution, he has discovered that although the strangler fig has been thought to be detrimental to forest growth, it is in fact essential to the survival of much fauna and therefore to the maintenance of many other tree species. Dr. Leighton is also deeply involved in the conservation training of Indonesian parks department personnel.

Along the Malaysian coast of Borneo, WCI and World Wildlife Fund-Malaysia are jointly supporting Dr. Elizabeth Bennett's study of the behavior and ecology of proboscis monkeys. Concurrently, she is working with local government officials to enlarge the protected areas of mangrove swamp for these unique primates. Dr. Bennett's work has furthered nutritional studies for the species at the Bronx Zoo, where the only breeding group of proboscis monkeys in the western hemisphere resides in JungleWorld.

The deciduous forest of Huai Kha Khaeng Wildlife Sanctuary in Thailand is the site of Dr. Alan Rabinowitz's study of clouded leopards and other large predators. One of four WCI Associate Research Zoologists around the world, Dr. Rabinowitz is working with the Wildlife Fund of Thailand, the Center for Wildlife Research of Mahidol University, and Dr. Sampoed Srikosarmatara, who receives support from WCI under a program for young scientists recently returned to their native countries after study abroad.

Funding for local scientists and conservation programs, in fact, is an ever growing priority for WCI. Some funds have been provided to Thai students and researchers through the Center for Wildlife Research, and WCI continues to sponsor the work of Thai biologist Surapon Duangkhae on the highly endangered Kitti's bat. In the Philippines, WCI supports research on wetlands, tarsiers, and the Palawan peacock pheasant, all led by promising young Filipino biologists.

Partly in connection with his clouded leopard work, Dr. Rabinowitz gave a series of lectures and workshops on wildlife ecology and research techniques in Taiwan, where he found a burgeoning enthusiasm for conservation. In response to his recommendations, the government has designated a protected area to be known as the Tawu Mountain Wildlife Sanctuary, which will contribute to the conservation of clouded leopards and many other species.

In China, Research Zoologist Dr. George Schaller, on leave as WCI director, expanded his wildlife surveys to include lengthy transects in eastern and western Tian Sian Province and the Tibetan Plateau. Travel-

ing in roadless areas by four-wheel drive vehicle, by camel and yak, he censused such unusual large mammals as ibex, argali, goitered gazelle, and Tibetan gazelle, among others, and found their numbers to be extremely sparse, despite the remoteness of their habitat. Though Dr. Schaller will continue his Tibetan studies for another two years, it is already abundantly clear that the Chinese government will have to pursue an aggressive conservation policy in the area if the once spectacular fauna of the high grasslands and mountain retreats is to survive.

African forests

About twenty percent of the world's closed canopy tropical forest is in Africa, mostly within the drainage basin of the 4,200km-long Zaire (Congo) River. Covering more than 200 million hectares, the Congo forest is second in area only to the Amazon forest, which is twice as large.

Like the Amazon, the Congo forest has to this date been saved by its size, despite a loss of some 300,000 hectares per year. On the other hand, there has been a negligible amount of planned forest management, and, in fact, the area under true management has declined by ninety percent in the past twenty years. As the countries in the Congo Basin gain political and economic stability, size will ultimately provide no safeguard against the forest con-



Proboscis monkeys are being studied by WCI Research Fellow Elizabeth Bennett in Borneo and by NYZS mammalogy and nutrition staff at the Bronx Zoo's JungleWorld.

version phenomenon. Already, the deforestation rate in the adjoining West African countries [Nigeria, Ivory Coast, and Ghana, for example] is seven times the world average, setting a trend that will eventually sweep the Congo as well.

To help meet this threat, WCI has launched the Congo Basin Initiative, which currently consists of three major projects devoted to "flagship," or "key-stone" species, the study of which should tell us a good deal about the ecosystems in which they live.

Dr. Richard Barnes is engaged in a massive effort to survey the forest elephant, a unique subspecies of the African elephant that ranges across the forested heart of the continent and is evidently the chief source of ivory in the world market. Beginning his census and distribution survey in Gabon, Dr. Barnes has now expanded his study area to include the entire Congo Basin—Zaire, the Congo Republic, Cam-

eroon and the Central African Republic—with the long-term objective of tightening international trade regulations and urging governments to manage forests for the conservation of this valuable species.

For their third year, Drs. John and Terese Hart are tracking the elusive okapi, a short-necked relative of the giraffe that is wholly confined to the deep shade of Zaire's Ituri Forest. Eight okapis, outfitted with radio transmitters, are now being monitored remotely, supplying data that will help the Harts to design a complex management concept for consideration by the Zaire government. Successful conservation in this case will depend on the accommodation of Mbuti pygmies, whose lives are an integral part of the ancient forest's dynamics.

The lowland gorilla is the flagship species in the third major project of the Congo Initiative. Parts of



In October 1986, WCI staff scientists discussed cooperative conservation and research efforts with curatorial and education staff members at the Bronx Zoo. Back row, from left: Charles Munn, Douglas Falk, James Doherty, Archie Carr, III, Stuart Strahl, Clifford Rice, Emil Dolensek, Donald Bruning, Thomas Struhsaker. Front row: Janet Stover, David Western, Fred Koontz, Christine Sheppard, Mary Pearl, George Schaller, Ellen Dierenfeld, Annette Berkovits, Patricia Mochlman, William Conway.

southwest Central African Republic have important populations of lowland gorillas which are in direct conflict with increasing human activities, including commercial logging, mineral extraction, coffee planting, and hunting. WCI Research Fellow Richard Carroll has found that forty-eight percent of the forest is controlled by exploitative interests, and that none of it is protected by reserve status. His research is therefore directed to establishing protected areas for gorilla preservation as well as managed multiple-use areas.

East Africa

The greatest savanna wildlife spectacles, particularly the problems of vast migrating wildlife populations and their coexistence with human populations, have been a focus of the New York Zoological Society's international logging, mineral extraction, coffee planting, and hunting. WCI Research Fellow Richard Carroll has found that forty-eight percent of the forest is controlled by exploitative interests, and that none of it is protected by reserve status. His research is therefore directed to establishing protected areas for gorilla preservation as well as managed multiple-use areas.

In Kenya, with special contributions from the Charles W. Nichols Foundation and the Liz Claiborne and Art Ortenberg Foundation, WCI contracted to rebuild a game fence along one boundary of Nairobi National Park, where black rhinos will be protected as part of the country's new national rhino survival strategy. Amboseli National Park's cattle-watering facilities, installed several years ago through the efforts of WCI Resource Ecologist Dr. David Western, are being overhauled and enlarged, with major funding from Royal Little.

In neighboring Tanzania, Dr. Western and WCI Staff Zoologist Dr. Patricia Moehlman are negotiating with national park and wildlife officials and developing a series of projects to improve management of Serengeti National Park, Selous Wildlife Reserve, and the Ngorongoro Crater Conservation Area (NCCA). In conjunction with Tanzanian authorities, Dr. Moehlman has already established a monitoring program within the NCCA, a unique area where domestic livestock belonging to Masai herdsman are permitted to graze alongside protected

native wildlife. Her work may lead to a better accommodation between people and wildlife.

Latin America

As elsewhere, a vital part of WCI's work in the Americas, from northern Mexico to southern Argentina, is devoted to the conservation of tropical forests. The effort is led by Associate Research Zoologists Dr. Charles Munn in Peru and Dr. Stuart Strahl in Venezuela. Chief technical advisor to the Fundación para la Defensa de la Naturaleza (FUDENA) and an adjunct professor at the University of Simon Bolívar in Caracas, Dr. Strahl has become a central figure in Venezuelan conservation. In addition to coordinating WCI-supported field projects on flamingos, crocodiles, and spectacled bears, he conducts his own studies of cracids and oilbirds. A conference organized by Dr. Strahl for 1988 on the cracid family—guans, curassows, and chachalacas—will bring together experts from throughout the hemisphere and should help to underline the need for forest reserves to protect these vulnerable, highly edible birds.

Dr. Munn's longstanding studies of macaws in Peru's Manu National Park were complemented during the year by his surveys of hyacinth macaw populations in Brazil and Bolivia, which will provide data for regulating international trade in this spectacular species. Meanwhile, Dr. Munn has been promoting sound development and conservation plans for all of southern Peru's unusually diverse and unspoiled jungles, partly through the educational park management activities of the Association for the Southern Forest, which he founded several years ago. During the past year, he undertook, with other scientists, a wildlife survey along the entire length of the Tambopata River with the hope of creating a new conservation unit in this region.

Marine conservation achieved a milestone in Belize with the establishment of the Hol Chan Marine National Park to protect a part of the Belize Barrier Reef. The declaration followed two years of effort by WCI Research Fellow Dr. Jacques Carter and his Belizean associate Janet Gibson. In his remarks at the opening ceremony in May 1987, the Honorable Dean Lindo, Minister of Agriculture, Wildlife, and Fisheries, expressed his hope that WCI would continue to assist with marine conservation along the 150-mile coral reef, which is so crucial to the young nation's future economic development and environmental preservation.

WCI Field Projects Around the World (1986-87)

North America

- | | | |
|---|--------------------------------|---------------------|
| 1 | Black-footed ferret
Wyoming | Tim W. Clark
USA |
|---|--------------------------------|---------------------|

Central America and the Caribbean

- | | | |
|---|---|---|
| 2 | Bahamas parrot study | Rosemarie Gnam
Bahamas |
| 3 | Comprehensive planning | Archie Carr III
Belize |
| 4 | Nassau grouper and
Barrier Reef research | Jacque Carter
Belize |
| 5 | W.I.Z.E. Project | Annette Berkovits
Belize |
| 6 | Marsh birds | Bruce Miller
Belize |
| 7 | Quetzal habitat
protection | Carlos Guindon
Costa Rica |
| 8 | Solenodon status | Jose Ottenwalder
Dominican
Republic |

South America

- | | | |
|----|--|--|
| 9 | The Magellanic penguin
at Punta Tombo | Dee Boersma &
William Conway
Argentina |
| 10 | Sea lion study | Claudio
Campagna
Argentina |
| 11 | Support for conservation
in Chubut | William Conway
Argentina |
| 12 | Valdes wildlife book | Graham Harris
Argentina |
| 13 | Oiled penguins | ECOBIOS
Argentina |
| 14 | Flamingo conservation | Ivan Castro &
Mario Parada
Chile |
| 15 | Primates of the Apaporis
River Basin | Thomas Defler
Colombia |
| 16 | South American fur seal | Patricia Majluf &
Pedro Vasquez
Peru |
| 17 | Ecology of Amazon
parrots | Charles Munn
Peru |
| 18 | Guans, curassows, and
oilbirds | Stuart Strahl
Venezuela |
| 19 | Flamingos | Miguelino
Lentino, Mary
Lou Goodwin, &
Stuart Strahl
Venezuela |
| 20 | Orinoco crocodile captive
breeding | John
Thorbjarnarson &
Tomas Blohm
Venezuela |

- | | | |
|----|--------------------------------|---|
| 21 | Spectacled bear survey | Isaac Goldstein &
Edgard Yereña
Venezuela |
| 22 | Crocodilian coastal
habitat | Andres Seijas
Venezuela |

Africa

- | | | |
|----|---|---|
| 23 | Black rhino trade
regulation | Esmond Bradley
Martin |
| 24 | Wildlife inventory, Kibira
National Park | Peter Trenchard
Burundi |
| 25 | Lowland gorilla status
and reserve | Richard Carroll &
Michael Fay
Central African
Republic |
| 26 | Ecology of the mountain
nyala and Bale Mountain
National Park
management | Chris Hillman
Ethiopia |
| 27 | Forest elephant | Richard Barnes
Gabon |
| 28 | West African manatee | James Powell
Ivory Coast |
| 29 | Zoological monitoring in
Amboseli National Park | David Western
Kenya |
| 30 | Capital improvements in
Amboseli National Park | David Western &
Government of
Kenya |





- | | | | | | |
|--|--|---|--|-----------------------------------|---|
| 31 Tana River primate conservation | M. Kinnaird, K. Medley, B. Decker, & P. Murphy
<i>Kenya</i> | 40 Elephant management in Luangwa Valley | Dale M. Lewis
<i>Zambia</i> | 51 Wildlife surveys, Tibet | George Schaller
<i>Peoples Republic of China</i> |
| 32 Black rhino genetic study | Don Melnick & David Western
<i>Kenya</i> | 41 Support for African elephant and rhino | David Cumming
<i>Zimbabwe</i> | 52 Eld's deer | Yanling Song
<i>Peoples Republic of China</i> |
| 33 Afromontane forest conservation | Amy Vedder
<i>Rwanda</i> | Asia and Oceania | | 53 Flying lemur | William Wischusen
<i>Philippines</i> |
| 34 Conservation education | John Oates & Anne Todd
<i>Sierra Leone</i> | 42 World tortoise survey | Ian Swingland | 54 Environmental education | James Connor
<i>Southeast Asia, Africa</i> |
| 35 Ungulate survey in Serengeti-Mara | A.R.E. Sinclair & Holly Dublin
<i>Tanzania</i> | 43 Mammals of the subtropical rain forest | William Laurance
<i>Australia</i> | 55 Conservation coordination | Warren Brockelman
<i>Thailand</i> |
| 36 Jackal ecology and Ngorongoro conservation area | Patricia Mochliman
<i>Tanzania</i> | 44 Effects of forest fire and drought | Judith Campbell
<i>Indonesia</i> | 56 Clouded leopard survey | Alan Rabinowitz
<i>Thailand</i> |
| 37 The Kibale Forest Project | Thomas Struhsaker
<i>Uganda</i> | 45 Tropical ecology | Mark Leighton
<i>Indonesia</i> | 57 Humpback whale studies, Hawaii | Deborah Glockner-Ferrari
<i>USA</i> |
| 38 Forest surveys | Thomas Struhsaker & Peter Howard
<i>Uganda</i> | 46 Proboscis monkey | Elizabeth Bennett
<i>Malaysia</i> | | |
| 39 Okapi ecology and behavior | Terese & John Hart
<i>Zaire</i> | 47 River terrapin | Edward Moll
<i>Malaysia</i> | | |
| | | 48 Snow leopard | Rodney Jackson
<i>Nepal</i> | | |
| | | 49 Macgregor's bowerbird | Bruce Beehler
<i>Papua New Guinea</i> | | |
| | | 50 Birds of paradise | Clifford & Dawn Frith
<i>Papua New Guinea</i> | | |



Public Affairs

As a public, non-profit organization, the New York Zoological Society depends each year on its members and contributors for essential funds to cover operating and capital expenses for all six divisions. This year, the total of gifts, pledges, membership dues, and bequests reached \$18,678,081. Highlighted in the efforts of the Public Relations and Advertising, Development, and Membership staffs were the Aquarium's ninetieth anniversary, the opening of Himalayan Highlands, the giant pandas' visit, and the expanding program of Wildlife Conservation International.

Capital funds

Of the \$2,745,756 contributed by individuals, foundations, and corporations for NYZS capital projects, \$1.9 million was designated for the new Central Park Zoo, which effectively completed fund-raising for the zoo at \$14,873,559, the Society's share of this City-Society renovation. Included were extraordinary gifts of \$1 million from the Henry and Lucy Moses Fund, Inc. for the zoo's Temperate Territory, \$610,000 from funds associated with the late Lila Acheson Wallace for the Central and Intelligence garden areas, \$250,000

from the Charles Hayden Foundation, and \$50,000 from the Horace W. Goldsmith Foundation.

As construction continued on Discovery Cove at the Aquarium, another joint City and Society project, about fifty percent of the private funding needed was in place. Outstanding gifts of \$100,000 each came from the Atholl McBean Foundation and The Schiff Foundation.

At the Bronx Zoo, the renovation of the old Elephant House, to be reopened as the Keith W. Johnson Zoo Center, and the planned African Plateau and Plaza were recipients of major gifts. The Nichols Foundation, Inc. through NYZS Honorary Chairman of the Board Charles W. Nichols, Jr., donated \$250,000 for the construction of VeldtLab, an on-site exhibition classroom. The Women's Committee, with proceeds from its June 1986 event, gave \$56,231 for the project.

A very special gift of \$250,000 was made by NYZS Advisor and Women's Committee President Dailey Pattee and her husband Gordon B. Pattee to fund the construction of exhibition facilities for the six-month visit of giant pandas to the Bronx Zoo.



... as news photographers recorded opening day for the visitors from China on April 30, 1987.

Budgetary funds

Individuals, private foundations, and corporations gave \$3,655,422 to help support the Society's diverse exhibition, education, conservation, and research programs. Trustee Enid A. Haupt pledged \$5 million in new endowment funds to maintain the complex operations of JungleWorld. The Marilyn Simpson Charitable Trust gave \$150,000 to endow research in zoological medicine at the Bronx Zoo's Animal Health Center. Bequests to the Society totaled \$4,770,152.

The Annual Patron's campaign, under the co-chairmanship of John Chancellor and Trustee John Elliott, Jr., enlisted 330 contributors to this special donor category, thirty-six more than last year. Patrons provided total support of \$471,763.

With NYZS Advisor Marshall Manley assuming chairmanship of the Business Committee, more than 100 corporations gave \$645,453, an increase of seven percent over last year's total. Responses to requests for the giant panda exhibit were particularly encouraging, with a number of gifts-in-kind and major underwriting from Merrill Lynch for the gala opening dinner.

Contributions from nearly 200 private foundations totaled \$1,525,874. The breeding and research programs of the Society's Wildlife Survival Center on St. Catherines Island in Georgia received \$270,000 from the Edward John Noble Foundation, and significant grants for Zoo Education were awarded by the Samuel and May Rudin Foundation and The Louis Calder Foundation.

Under Trustee Henry Clay Frick II, the Aquarium and Osborn Laboratories Planning Committee raised \$283,764 during the year. Part of that was a research grant from the Perkin Fund for the work of Dr. Klaus Kallman at OLMS.

Fund-raising activities were supported by the work of the department's Guest Services program, which managed 55 meetings, receptions, luncheons, dinners, and tours at the Zoo, the Aquarium, and other sites in the city. Several of the major events centered on the visiting pandas. In one of its most successful fund-raising events yet, the Women's Committee marked its fifteenth anniversary with the "Crystal Celebration" at the Bronx Zoo in June. J.C. Penney Company provided underwriting support for the evening.

Conservation funds

Of the \$1,155,653 received for the programs of Wildlife Conservation International (WCI), \$554,104 came from individuals, \$500,144 from foundations, and \$101,405 from corporations. Significant new grants

included \$104,000 from the Liz Claiborne and Art Ortenberg Foundation for critical capital improvements at Nairobi and Nakuru National Parks in Kenya and \$75,000 from the Jessie Smith Noyes Foundation for the professional development of promising Third World biologists and conservation managers. Support for global field training programs from the J.N. Pew, Jr. Charitable Trust continued as a result of its 1986 grant of \$140,000.

Under the leadership of Trustee John Pierrepont, chairman of the Conservation Committee, eighteen new William Beebe Fellows made endowment gifts to WCI of \$10,000 each, more than doubling this prestigious donor circle. Income from endowed funds now supports eleven WCI staff salaries, so that all other contributions to WCI can be allocated directly to field conservation programming—a unique situation among non-profit organizations. Sixteen new Friends of WCI joined the rolls with \$2,500 contributions, bringing the total to eighty-five.

Corporate participation was encouraging, with an increase of one-third. Donors included Exxon Corporation, Ogilvy Foundation, Xerox Foundation, and Mill Pond Press Inc.

Membership

Over the past decade, membership in the New York Zoological Society has nearly quadrupled, reaching 30,816 on June 30, 1987. For the year, membership dues added \$1,593,612 to the Society's income, an increase of eleven percent over last year. Members contributed additional support of \$183,000 as a result of special appeals. And a growing number of people became members through corporate matching gift programs, which totaled more than \$100,000 in dues and contributions.

The two sessions of the Society's annual meeting drew full houses at Avery Fisher Hall in Lincoln Center to celebrate the ninetieth anniversary of the Aquarium. Spring events at the Zoo and Aquarium, including the Aquarium cleanup, were also well attended. In May and June many of these events focused on the two giant pandas visiting from China. Some 4,800 members subscribed to the "Picnic with the Pandas," requiring the scheduling of two additional evenings after the initial event. In May and June, more than 8,100 people also took advantage of special members' hours to visit the pandas on Wednesday and Saturday mornings, and many others breakfasted and lunched with Ling Ling and Yong Yong at a variety of events.

NYZS members were not limited to adventures with the confines of the Zoo and Aquarium. There were



Kodak's Colorama display with photos of Yong Yong and Ling Ling by Neil Montanus greeted millions of commuters in Grand Central Station.

tours to the wildlife refuge in Jamaica Bay, to Cape Cod for whale watching, and to the Hudson River for a day aboard the sloop *Clearwater*. Abroad, members helped to band penguins in Patagonia, studied macaws in Peru's Manu National Park, and went on safari in East Africa—all under the leadership of NYZS staff and with the participation of WCI scientists in the field.

Public Relations, Advertising, and Special Events

The burgeoning worldwide programs of Wildlife Conservation International received greatly increased coverage from electronic and print media alike. In October, twenty-two press representatives attended the WCI-sponsored Conservation 2100, a four-day conference at Rockefeller University which brought together zoologists, social scientists, philosophers, and other authorities to discuss the present and future of conservation efforts around the world. In December and February, field projects conducted by Alan Rabinowitz in Thailand, Dee Boersma in Argentina, and Patricia Mochlman in Tanzania were featured on NBC's *Today Show*. And by the end of the year, production of the National Geographic Society's televised report "The Rhino War," part of the "Explorer" series on which the Society has collaborated before, was nearing completion. WCI Resource Ecologist David Western served both as scientific consultant and on-air spokesperson.

Awareness of WCI activities was also enhanced by a series of radio and public service announcements to which NYZS Conservation Committee members Jane Alexander and George Plimpton contributed their professional narrating skills. These spots, along with print ads for newspapers and magazines, were distributed nationally.

Culminating the Bronx Zoo's media year was the visit of giant pandas from China as part of an effort to preserve these vanishing creatures. More than 100 newspaper covered their debut on April 30, with Mayor Koch and Beijing Deputy Mayor Feng Mingwei officiating, and the Public Relations staff handled more than 250 requests for information, including 45 from overseas news organizations. The Society's continued collaboration with Philip Morris Companies Inc. provided expanded billboard space for the pandas around the City, and New York City Transit System advertising in subways and subway stations reached millions of people. Kodak celebrated the visiting pandas, Yong Yong and Ling Ling, by featuring them, much larger than life, on the eighteen-by-sixteen-foot Colorama display in Grand Central Terminal.

The Zoo was celebrated too in a comprehensive article that first appeared in the *Denver Post* and was then syndicated to 600 newspapers worldwide. On television, the Zoo, Aquarium, Wildlife Survival Center, and new Central Park Zoo were prominently featured in an installment of *The Nature of Things* on the relationship between zoos and animals in the wild, produced for the Canadian Broadcasting Company and shown on public channels throughout North America.

A number of Aquarium events were well chronicled, particularly the ninetieth anniversary observance on December 10, 1986, attended by Brooklyn Borough President Howard Golden and a host of community leaders. Next door, research at the Osborn Laboratories of Marine Sciences was given notable attention by *The New York Times* in an article devoted to the OLMS study of dolphin and whale neuroanatomy and intelligence.

Ongoing public information programs for the Zoo and Aquarium were expanded. A half million brochures were distributed at travel and tourist outlets throughout the tri-state area. Three hundred and fifty thousand quarterly calendars of Zoo and Aquarium events were mailed to schools, libraries, and civic groups. And 50,000 "Let's Keep in Touch" cards were handed out to visitors who wished to be kept up to date about Zoo and Aquarium activities.

Travel and conservation: A change in emphasis

As a service and to encourage greater reader involvement in wildlife appreciation, many more articles in *Animal Kingdom* during the year were supplemented with travel information related to the subjects and areas being discussed. Travel for the purpose of seeing wildlife was also the focus of the entire November/December 1986 issue, under the title "Wildlife Travel Adventures." Special attention was given to the natural wonders of Argentina, Latin American crafts markets, whale-watching in Hawaii, nature reserves in Australia, exploring the Belize Barrier Reef, and photographing ground squirrels in North America.

Of all the articles published in *Animal Kingdom*, thirty-six percent were generated by research projects of Wildlife Conservation International. Featured were field reports by WCI scientists on the primates of Uganda's Kibale Forest, southern sea lions in Argentina, humpback whales off Hawaii, proboscis monkeys in Borneo, ocelots in Peru, Nassau groupers in Belize, spectacled bears in South America, white-eared kob in Sudan, and Tibetan wildlife.

The editors also launched a new photo-essay feature titled "Zoo World," highlighting outstanding new zoo and aquarium exhibits around the country. The series began with the Bronx Zoo's own Himalayan Highlands.

Reading the readers

Readers responded positively to the magazine's new approaches and to *Animal Kingdom* in general, according to studies of subscriber preferences conducted by Mark Clements Research for four 1986-87 issues. The travel issue received high ratings on almost all counts—articles, photos, covers, and sidebars. The humpback whale story led, with 76.5 percent of readers finding it "very interesting," 95.9 percent indicating some degree of interest and involvement, and 97.6 percent impressed by the whale photos. These and other ratings compare favorably with the 50 percent that is considered good by industry standards.

In terms of overall reader satisfaction, publishers aim for a 60 percent approval rating. The average for all 1986 *Animal Kingdom* issues reached the highest level ("very satisfactory") at 68.2 percent, with another 30.6 percent indicating some satisfaction.

Subscriber likes and dislikes have also been registered on specific subjects. For example, readers repeatedly request more information on endangered

species, a surprise to staff members who believed the magazine already covered the topic extensively. In response, changes have been made to emphasize endangered status and to devote more space to the problem. Readers have also displayed relatively little interest in most reviews of nature-oriented movies and television shows, so these, for the most part, are being dropped.

In sheer numbers, reader approval has reached a new high point. For the six-month period ending December 1986 the Business Publications Audit recorded an average of 155,437 qualified paid subscribers, a seven percent increase over the previous year. Although some zoological societies ended their *Animal Kingdom* affiliation, a larger number joined the consortium, bringing the total to a record thirty-seven participating zoos in twenty-six states.

Photographic services: star performers

The visit of the giant pandas to the Bronx Zoo from the Peoples Republic of China resulted in a torrent of picture-taking before and after their arrival in mid-April. NYZS staff photographers spent hours capturing the antics of Ling Ling and Yong Yong in color and black-and-white photos and motion-picture film. The latter will be a highlight of the Zoo-Aquarium film to be shown at the annual members meeting in February 1988.

Earlier, the focus of-interest had been Himalayan Highlands, the Zoo's new habitat exhibition for snow leopards, red pandas, tragopans, and white-naped cranes. Recorded on film were the last stages of construction, the introduction of animals into the exhibit, the opening ceremonies on September 26, 1986, and, once winter arrived, snow leopards in the snow.

In the spring, the stars were baby animals born and hatched around the Zoo: a polar bear cub, three sea lion pups born within ten days in June, three snow leopard cubs at Himalayan Highlands, the latest in long line of Baringo giraffes named James, two Waldrapp ibises, and a slew of Chinese alligators. In all some 2,500 color slides and 1,200 black-and-white photographs were produced by Photo Service during the year, many of which were used in *Animal Kingdom* and others in brochures, posters, permit and award applications, slide presentations, wildlife classes, fund-raising proposals, signage, and this report, as well as magazines and books produced by outside publishers.

Administrative Services

Admissions, Parking, Transportation, and Group Sales

Bronx Zoo attendance totaled 2,183,357 for the year, culminating in nearly 435,000 for May 1987, the giant pandas' first month on view. This was the highest monthly total in ten years. New York Aquarium attendance reached 706,622, an increase of nearly fourteen percent over last year.

The Zoo's transportation systems served more than 1.3 million people. Leading the way was the Bengali Express monorail in Wild Asia with 567,652 riders, followed by 422,048 on the Skyfari and 320,356 on the Safari Tour Trains. JungleWorld drew 472,399 visitors.

Group Sales at the Zoo accounted for a new high of 128,644 admissions, partly due to the development of relationships with governmental and tourist agencies. Supervisor of Group Sales Margaret Price was named co-chairman of the New York State Travel and Vacation Association in 1987.

Food and souvenirs

The visit of the pandas had the most dramatic effect in expanding services and increasing sales. With the loan of sixteen mobile food stands by two major suppliers—Good Humor and Coca-Cola—it was possible to serve people near the panda exhibition and in other areas remote from the Zoo's stationary restaurants and stands. A tremendous range of giant panda souvenirs, with some proceeds designated for the conservation of these rare creatures in China, was offered in a temporary thirty-by-fifty-foot sales tent near the exhibition, outfitted with display cases supplied by R.H. Macy and Company.

Plans were adopted for a greatly improved food and souvenir court, in the location of the present cafeteria near the Wildfowl Pond, that will include a Zoo shop, catering services, and a new staff dining room as well as expanded indoor and outdoor public eating areas. Architectural plans have been completed and groundbreaking is expected in the coming year.

At the Aquarium, food and souvenir sales reflected the continuing growth in attendance.

Personnel

On June 30, 1987, the full-time staff of the New York Zoological Society totaled 459 employees (listed by department on pages 75-78 of this report) at the Bronx Zoo, New York Aquarium, Osborn Laboratories of Marine Sciences, Wildlife Survival Center, Wildlife Conservation International, and City Zoos Project.

From July through October 1986 and April through June 1987, there were also 675 seasonal workers employed at the Zoo and Aquarium to sell food, souvenirs, admission tickets, and memberships; to maintain the grounds and facilities; and to guide tours on the Bengali Express monorail and Safari Tour Trains. A special training program was instituted for seasonal employees, many of them holding their first jobs, to teach practical skills in retail sales, food service, and customers relations, and provide information about the work of the Society. Funded in part by the DeWitt Wallace Fund and the Bernhill Fund, this twelve-hour curriculum reached 320 people and will become an integral part of seasonal employment in 1988.

In other special programs, senior citizens and developmentally disabled individuals were employed in greater numbers than ever before.



A young visitor enjoyed one of the reasons to stay at the Zoo all day.

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Report of the Treasurer

During the year ended June 30, 1987, revenue for general operations exceeded expenditures by \$163,399. Capital improvement expenditures exceeded operating support and revenue by \$1,119,427. Investment gains offset this deficit by \$912,047, requiring \$207,380 to be withdrawn from Society reserves.

Contributions from individuals, foundations, and corporations provided twelve percent of total operating support and revenue. Fund-raising efforts produced \$12.5 million for operating, capital, and endowment purposes. Special events, including the Women's Committee's Crystal Celebration in June 1987, netted nearly \$600,000.

Bequests provided an additional \$4.8 million, of which \$4.4 million represented further distributions from the estates of Mr. and Mrs. James Walter Carter. In keeping with their expressed interests, these funds will function as endowment for the Society's conservation and animal health programs.

CONTRIBUTIONS AND PLEDGES (000)

	Operations	Capital	Endowment	Bequests	Total
1987	\$ 4,240	\$ 2,746	\$ 5,329	\$ 4,770	\$ 17,085
1986	3,290	4,923	76	778	9,067
1985	3,388	9,404	1,194	5,971	19,957
1984	3,160	7,974	2,601	114	13,849
1983	2,536	1,872	2,370	162	6,940

Approximately \$67 million has been raised in the last five years, more than one-third for endowment purposes designated by donors or the Society's board of trustees.

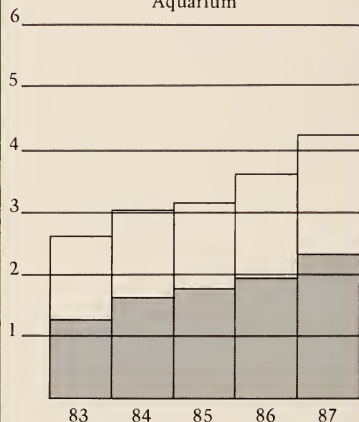
The City of New York and New York State continue to provide basic operating support to the Zoological Park and Aquarium. Federal sources provide sixty-five percent of the Osborn Laboratories of Marine Sciences funds in addition to contributing toward the cost of educational programs at the Zoological Park.

GOVERNMENT SUPPORT FOR OPERATING PURPOSES (000)

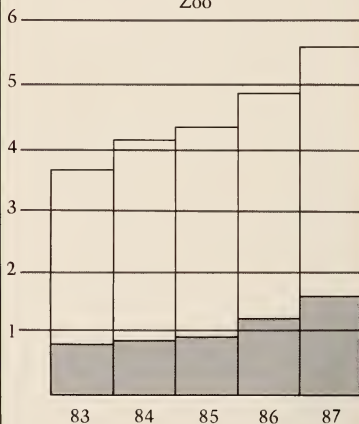
	City	State	Federal	Total
1987	\$ 8,136	\$ 2,069	\$ 299	\$ 10,504
1986	7,994	1,990	384	10,368
1985	6,934	1,419	286	8,639
1984	6,622	1,326	331	8,279
1983	5,858	971	400	7,229

PER CAPITA SPENDING (in dollars)

Aquarium



Zoo



■ Admissions
□ Food, Souvenir & Exhibits

While the dollar amount provided by government agencies to the Society increased, this source declined modestly from thirty-three to thirty-one percent as a percentage of operating support.

City funds supported 227 wild animal keepers and Zoo and Aquarium maintainers, up from 195 in fiscal 1983. The Department of Parks and Recreation commenced operating support at the Central Park Zoo in fiscal 1987 by funding four positions. Monies received from New York State through the Natural Heritage Trust were more than twice the amount received five years ago. Additionally, the City committed \$2.7 million for capital improvements at the Zoological Park and Aquarium.

Combined attendance at the Zoo and Aquarium remained level compared to the previous year. A decline at the Zoo was offset by a fourteen percent increase at the Aquarium. Attendance at Society facilities is sixteen percent greater than five years ago.

VISITOR ATTENDANCE

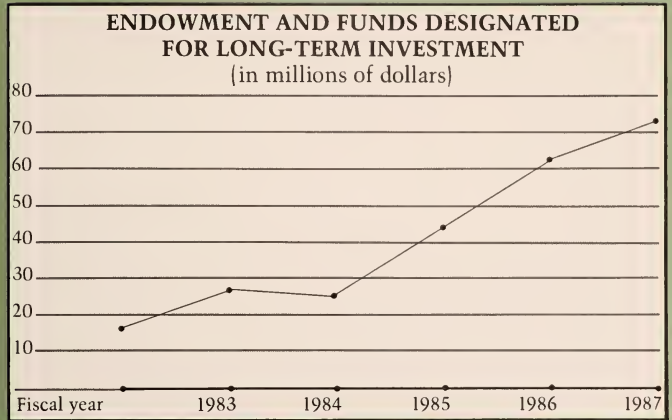
Fiscal	Zoological Park	Aquarium	Combined
1987	2,183,357	706,622	2,889,979
1986	2,267,940	621,547	2,889,487
1985	2,167,386	608,563	2,775,949
1984	1,929,282	529,599	2,458,881
1983	2,032,807	460,132	2,492,939

The Zoo's free admission policy on Tuesdays, Wednesdays, and Thursdays enabled fifty-five percent of all visitors to enter without paying any admission fees.

Visitor per capita spending reflected impressive gains at the Zoo and Aquarium. The giant panda exhibit, which opened at the end of April, boosted weekend attendance at the Zoo and raised souvenir sales by nearly \$400,000 to \$1.9 million.

At the Zoo, per capita spending increased from \$3.77 in 1983 to \$5.61 in 1987. Aquarium per capita increased from \$2.56 to \$4.19 in the same time period. For the second consecutive year, visitor revenue provided more than \$2 million to underwrite capital improvements. These funds are used to marshal government and private sources for a cooperative capital improvement program that reflects the Society's responsibility to educate millions of citizens in the New York metropolitan area.

Endowment and funds designated for long-term investment increased nearly fourfold in the last five years. The annualized



return on the Society's portfolio over the last five years has been 28.9 percent, ranking the Society portfolio in the top seventh percentile of such funds.

Operating expenditures increased \$3.5 million. The recent increases in casualty and property insurance premiums accounted for more than one-quarter of this increase. Coverage that cost \$600,000 in 1986, cost \$1.5 million in 1987, five percent of general operating expenses. Two years ago similar coverage cost \$200,000. Personnel expenditures represented fifty-six percent of Society expenditures. Purchased services, supplies, repairs, food, and forage accounted for twenty-two percent. Utilities, cost of product sold for food and souvenir sales, and other expenses were seventeen percent.

At the Zoological Park, construction began on the Cogeneration and District Heating System and is expected to be completed in fiscal 1988. The Himalayan Highland Exhibit was opened in September 1986, and plans were being developed for an African Highlands exhibit. At the Aquarium, construction continued on Discovery Cove, scheduled to open in spring 1989. Construction at the Central Park Zoo accelerated during the past year and the new facility is to open as scheduled in June 1988. Nearly two-thirds of private source capital expenditures were funded by contributions and earnings thereon. The balance, as noted above, was provided by visitor revenues.

David T. Schiff
Treasurer



Peat Marwick

Peat Marwick Main & Co.
Certified Public Accountants
345 Park Avenue
New York, NY 10154

The Board of Trustees
New York Zoological Society:

We have examined the balance sheet of New York Zoological Society as of June 30, 1987 and the related statements of support and revenue, expenditures, capital additions and changes in fund balances and of change in financial position for the year then ended. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

As explained in note 1 to the financial statements, expenditures for land, buildings and equipment are not capitalized, and depreciation of buildings and equipment is, therefore, not recorded. Such practices are not in conformity with generally accepted accounting principles.

In our opinion, except for the effect on the financial statements of the matter discussed in the preceding paragraph, the aforementioned financial statements present fairly the financial position of New York Zoological Society at June 30, 1987 and the results of its operations and the changes in its financial position for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

September 2, 1987

Peat Marwick Main & Co.

A heated moment at the Kodiak bear exhibit.



New York Zoological Society
 Balance Sheet
 June 30, 1987

Assets	Operating funds	Endowment funds
Cash, including short-term investments of \$6,377,781	\$8,593,215	—
Investments (note 2)	34,597,548	33,158,300
Accounts receivable	848,164	—
Grants and pledges receivable	4,586,674	—
Inventories, at lower of cost or market	1,167,892	—
Prepaid expenses and deferred charges	1,676,921	—
	<u>\$ 51,470,414</u>	<u>33,158,300</u>
Liabilities and Fund Balances		
Accounts payable and accrued expenses	3,722,170	—
Loan payable (note 3)	334,323	—
Deferred restricted support and revenue (note 6)	20,643,599	—
	<u>24,700,092</u>	<u>—</u>
Fund balances:		
Unrestricted:		
Designated for long-term investment	23,284,530	—
Undesignated	3,485,792	—
Endowment:		
Income unrestricted	—	9,333,054
Income restricted	—	11,892,071
Term endowment—income unrestricted (note 4)	—	11,933,175
	<u>26,770,322</u>	<u>33,158,300</u>
	<u>\$51,470,414</u>	<u>33,158,300</u>

See accompanying notes to financial statements.

Statement of Support and Revenue, Expenditures, Capital Additions, and Changes in Fund Balances
Year ended June 30, 1987

	Operating funds			Endowment funds
	General	Capital	Total	
Operating support and revenue:				
Contributions and fund raising events, net	\$ 3,945,468	2,913,549	6,859,017	—
Government support:				
City of New York (note 9)	8,135,993	—	8,135,993	—
Other	2,367,948	—	2,367,948	—
Admission and parking fees	5,964,540	—	5,964,540	—
Visitor services revenues (note 10)	7,144,366	2,099,822	9,244,188	—
Membership dues	1,593,612	—	1,593,612	—
Endowment and other investment income	2,801,945	406,063	3,208,008	—
Publications and related revenues	1,018,108	—	1,018,108	—
Education programs revenue	267,455	—	267,455	—
Collection sales (note 7)	—	69,606	69,606	—
Miscellaneous revenue	233,922	—	233,922	—
Total operating support and revenue	<u>33,473,357</u>	<u>5,489,040</u>	<u>38,962,397</u>	—
Expenditures:				
Program services:				
Zoological Park	20,172,351	2,309,031	22,481,382	—
Aquarium	3,931,312	656,956	4,588,268	—
Survival Center	270,616	—	270,616	—
Wildlife Conservation International	1,910,627	—	1,910,627	—
Marine Sciences	532,023	—	532,023	—
Publications	1,243,839	—	1,243,839	—
Membership activities	625,525	—	625,525	—
City Zoos project (note 8)	242,093	3,502,978	3,745,071	—
Total program services	<u>28,928,386</u>	<u>6,468,965</u>	<u>35,397,351</u>	—
Supporting services:				
Management and general	2,862,725	139,502	3,002,227	—
Fund raising	1,518,847	—	1,518,847	—
Total supporting services	<u>4,381,572</u>	<u>139,502</u>	<u>4,521,074</u>	—
Total expenditures	<u>33,309,958</u>	<u>6,608,467</u>	<u>39,918,425</u>	—
Excess (deficiency) of operating support and revenue over expenditures, carried forward	<u>163,399</u>	<u>(1,119,427)</u>	<u>(956,028)</u>	—

(continued)

Statement of Support and Revenue, Expenditures, Capital Additions, and Changes in Fund Balances (cont'd.)

	Operating funds			Endowment funds
	General	Capital	Total	
Excess (deficiency) of operating support and revenue over expenditures, brought forward	\$ 163,399	(1,119,427)	(956,028)	—
Bequests	4,770,152	—	4,770,152	—
Realized net gains on investments	2,279,774	912,047	3,191,821	—
Excess (deficiency) of support and revenue over expenditures before capital additions	7,213,325	(207,380)	7,005,945	—
Capital additions:				
Contributions	—	—	—	1,392,305
Realized net gains on investments	—	—	—	3,789,682
Total capital additions	—	—	—	5,181,987
Excess (deficiency) of support and revenue over expenditures after capital additions	7,213,325	(207,380)	7,005,945	5,181,987
Fund balances at beginning of year	19,764,377	—	19,764,377	27,976,313
Transfer to fund capital expenses	(207,380)	207,380	—	—
Fund balances at end of year	<u>\$ 26,770,322</u>	<u>—</u>	<u>26,770,322</u>	<u>33,158,300</u>

See accompanying notes to financial statements.



Pinkie and her one-year-old daughter Ella in Wild Asia.

Statement of Changes in Financial Position
Year ended June 30, 1987

	Operating funds	Endowment funds
Resources provided:		
Excess of support and revenue over expenditures before capital additions	\$ 7,005,945	—
Capital additions:		
Contributions	—	1,392,305
Realized net gains on investments	—	3,789,682
	<hr/>	<hr/>
Excess of support and revenue over expenditures after capital additions	7,005,945	5,181,987
Items which do not provide resources—realized net gains on investments	(4,266,099)	(3,789,682)
Decrease in grants and pledges receivable	2,777,332	—
Increase in deferred restricted support and revenue	1,493,728	—
Increase in accounts payable and accrued expenses	792,733	—
Increase in loan payable	334,323	—
	<hr/>	<hr/>
Total resources provided	8,137,962	1,392,305
Resources used:		
Increase in accounts receivable	348,648	—
Increase in inventories	585,282	—
Increase in prepaid expenses and deferred charges	109,916	—
Purchase of investments, net of sales of \$27,119,778	4,047,380	1,392,305
	<hr/>	<hr/>
Total resources used	5,091,226	1,392,305
	<hr/>	<hr/>
Increase in cash	<u>\$ 3,046,736</u>	<u>—</u>

See accompanying notes to financial statements.

Notes to Financial Statements
June 30, 1987

(1) Summary of significant accounting policies

The financial statements of the Society have been prepared on the accrual basis except for depreciation as explained below. Other significant accounting policies follow:

Fund accounting

In order to ensure observance of limitations and restrictions placed on the use of available resources, the accounts are maintained in accordance with the principles of fund accounting. This is the procedure by which resources for various purposes are classified for accounting and reporting purposes into funds established according to their nature and purposes. Separate accounts are maintained for each fund; however, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups.

(continued)

Notes to Financial Statements (continued)

The assets, liabilities and fund balances of the Society are reported in two self-balancing fund groups:

Operating funds, which include unrestricted and restricted resources:

- Unrestricted funds represent the funds available for the support of Society operations.
- Funds restricted by the donor, grantor, or other outside party for particular operating purposes (including accessions and other capital additions) are deemed to be earned and reported as revenues of operating funds when the Society has incurred expenditures in compliance with the specific restrictions. Such amounts received but not yet earned are reported as deferred restricted support and revenue.

Endowment funds, which include the following restricted resources:

- Funds that are subject to restrictions of gift instruments requiring in perpetuity that the principal be invested and only the income be used.
- Term endowment funds which must be held intact except that, at some future date or specified occurrence, some portion or all of the principal may be used (see note 4).

Plant assets and depreciation

Plant acquisitions including buildings and improvements constructed on land owned by the City of New York are not capitalized and, accordingly, depreciation is not recorded in the Society's financial statements. Major expenditures for buildings and improvements are reflected as capital expenditures in the accompanying financial statements.

Collections

Expenditures for collections are not capitalized.

Other matters

All gains and losses arising from the sale, collection or other disposition of investments and other noncash assets are accounted for in the fund that owned the assets. Ordinary income from investments, receivables, and the like is accounted for in the fund owning the assets, except for income derived from investments of endowment funds, which is accounted for, if unrestricted, as revenue of the unrestricted operating fund or, if restricted, as deferred amounts until the terms of the restriction have been met.

Enforceable pledges for operating purposes, less an allowance for uncollectible amounts, are recorded as receivables in the year made. Pledges for support of current operations are recorded as operating fund support. Pledges for support of future operations are recorded as deferred amounts in the operating fund. Pledges to the endowment funds are recognized upon payment of the pledge.

(2) Investments

Investments are reflected at cost or fair market value at date of gift. The market value and carrying value of investments by fund at June 30, 1987, were as follows:

	Market value	Carrying value
Operating funds—expendable	\$44,439,511	34,597,548
Endowment funds—nonexpendable	44,746,759	33,158,300
	<u>\$89,186,270</u>	<u>67,755,848</u>

Details of investment assets at June 30, 1987, were as follows:

	Market value	Carrying value
Cash	\$ 365,581	365,581
Short-term investments	28,999,965	28,995,071
Corporate stocks	49,754,768	28,193,850
U. S. Government obligations	10,065,956	10,201,346
	<u>\$ 89,186,270</u>	<u>67,755,848</u>

(continued)

Notes to Financial Statements (continued)

Investment assets of endowment funds and operating funds are pooled on a market value basis with each individual fund subscribing to or disposing of units on the basis of the value per unit at market value, determined quarterly. Of the total units, each having a market value of \$258.39, 173,173 units were owned by the endowment funds and 171,984 units were owned by operating funds at June 30, 1987. The average earnings per unit, exclusive of net gains, approximated \$9.15 for the year.

The following tabulation summarizes changes in relationships between carrying values and market values of investment assets:

	Market value	Carrying value	Net gains
End of year	\$ 89,186,270	67,755,848	21,430,422
Beginning of year	<u>75,338,771</u>	<u>54,260,382</u>	<u>21,078,389</u>
Unrealized net gains for year			352,033
Realized net gains for year			<u>8,055,781</u>
Total net gains (losses) for year			<u>\$ 8,407,814</u>

(3) Loan payable

Construction of a cogeneration facility at the Zoological Park began during 1987. The estimated cost of the project is \$8,700,000. The City of New York through its capital improvement budget is funding approximately \$5,000,000. The balance, \$3,700,000, is being funded by the Society of which approximately \$2,400,000 has been expended through June 30, 1987. An Urban Development Action Grant is providing up to \$1,000,000 in financing through a loan from the Financial Services Corporation. At fiscal year end, \$334,323 had been borrowed by the Society. The loan agreement requires monthly interest payments at an annual rate of 10%. The principal balance outstanding under the terms of the loan agreement is due upon maturity at December 30, 1991.

(4) Term endowment (Animal Kingdom Fund)

During 1976, the Society initiated a capital funds campaign. The campaign included a term endowment fund to serve various functions, as described below, subject to the following conditions:

- (a) The income of the term endowment fund shall be used for the general operating purposes of the Society and
- (b) The principal of the term endowment fund may be expended only upon the affirmative vote of two-thirds of the Trustees present at any duly held meeting of the Board of Trustees or its Executive Committee: (i) to finance programs or improvements to facilities (i.e., the Zoological Park, the New York Aquarium, or other facilities of the Society) to produce revenue or increase attendance; or (ii) to ensure the survival of the Society if funds from other sources fail to provide sufficient revenue to maintain the Society's programs; provided, however, that in the case of any contribution to the term endowment fund which was subject to a restriction not to expend the principal of such contribution without the prior consent of the donor thereof, in addition to the vote of the Trustees described above, such consent must be obtained in writing prior to the expenditure of such principal.

(5) Pension plan

All eligible Society employees are members of the Cultural Institutions Retirement System's (CIRS) Pension Plan. Pension expense was approximately \$1,034,000, of which approximately \$458,000 was financed by an appropriation from the City of New York. The current year's provision includes amortization of prior service costs over a period of 30 years commencing June 30, 1974. The Society's policy is to fund pension cost accrued and no unfunded vested benefits existed as of June 30, 1986, the date of the latest plan valuation.

Because the CIRS Plan is a multi-employer plan, certain information as it relates to vested and non-vested benefits as well as plan assets is not readily available.

(continued)

Notes to Financial Statements (continued)

(6) Deferred restricted support and revenue

The changes in deferred restricted support and revenue for the year ended June 30, 1987, are as follows:

	Balance at beginning of year	Additions	Expenditures	Balance at end of year
Contributions and fund raising events	\$ 16,722,545	5,513,303	5,419,506	16,816,342
Fees and grants from governmental agencies	234,663	251,446	240,186	245,923
Investment income	1,084,274	1,369,417	1,141,626	1,312,065
Net gains on investment transactions	987,992	1,986,325	912,047	2,062,270
Other	120,397	240,208	153,606	206,999
Total	<u>\$ 19,149,871</u>	<u>9,360,699</u>	<u>7,866,971</u>	<u>20,643,599</u>

(7) Collections

During the year ended June 30, 1987, animal collection accessions aggregated approximately \$60,000 while deaccessions aggregated approximately \$70,000.

(8) City Zoos Project

The Society and the City of New York have entered into agreements with respect to the Central Park Zoo, Prospect Park Zoo, and Flushing Meadows Zoo. Each agreement provides for the City's renovation of these zoos in accordance with plans developed through consultation with the Society and approved by the City, and thereafter, for the Society's operation and management of each with funding from the City, for an initial 50-year term, renewable by the Society for five additional 10-year terms. Except for the Central Park Zoo, the Society will expend no monies for construction. The Society has committed approximately \$20,000,000 toward design and renovation costs at the Central Park Zoo, of which approximately \$9,000,000 has been expended through June 30, 1987.

(9) City of New York support

The Department of Cultural Affairs of the City of New York, in addition to providing general operating support, has reported to the Society that during fiscal 1987 it committed approximately \$2,700,000 at the Zoological Park and the Aquarium for capital improvements. Such commitments are not included in the accompanying financial statements.

(10) Visitor Services revenues

Details of visitor services revenues at June 30, 1987 were as follows:

Food sales	\$4,349,470
Souvenir sales	2,340,010
Exhibit admissions	584,547
Transportation revenues	925,711
Group sales	407,975
Children's Zoo revenues	565,457
Animal rides	71,018
	<u>\$ 9,244,188</u>

Visitor services provided approximately \$2,100,000 in revenue for capital improvement projects at the Zoological Park and the Aquarium. The amount allocated to capital improvement projects represents the gross profit from food and souvenir sales less an allowance for overhead costs.

Contributions, Pledges, and Payments on Pledges of \$1,000 and Over (July 1. 1986-June 30, 1987)

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Mrs. Peter O. Lawson-Johnston
Mrs. John H. Leib
Mrs. Roman Martinez IV
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Mrs. Charles H. Mott
Mrs. John W. Pershing
Mrs. Roy Plum
Mrs. Tucker Ridder
Mrs. Alexander B. Slater
Mrs. James F. Stebbins

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Mrs. William Feick
Julie Kammerer
Mrs. Charles W. Nichols, Jr.
Mrs. Gordon B. Pattee
Mrs. Harmon L. Remmel
Mrs. Joseph R. Siphron
Anne H. Stevenson
Mrs. Landon K. Thorne, Jr.

Women's Committee President Dailey
Pattee cuts the ribbon to officially open
Himalayan Highlands.



Staff of the New York Zoological Society

General NYZS Staff

Administration

Executive Management

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John McKew, *Director of Administrative Services*
Timothy O'Sullivan, *Deputy Director of Administrative Services*
Louise Ingcnito, *Secretary to the General Director*
Adriane Maisell, *Supervising Departmental Stenographer*

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Kathleen Wilson, *Administrator*
Rosa Payne, *Departmental Stenographer*

Government Affairs

Roger McClanahan, *Officer*
Nancy Sosnow, *Coordinator*
Anne Baraldi, *Supervising Departmental Stenographer*

Financial Services

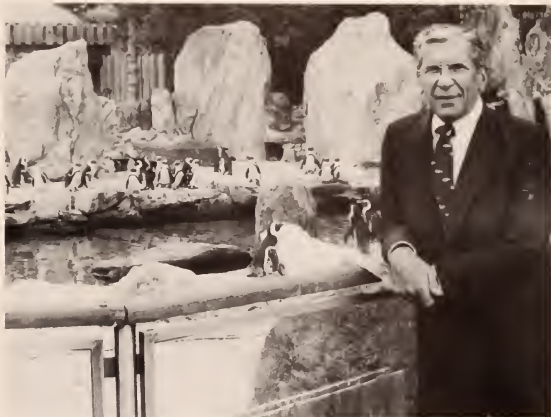
John G. Hoare, *Comptroller*
John I. Albers, *Assistant Comptroller*
Howard Forbes, *Data Processing Manager*
James Morley, *Purchasing Manager*
Ronald Ventarola, *Chief Accountant*
Michael Mariconda, *Budget Analyst*
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Albert Corvino, *Accountant*
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Patricia DePalma, *Senior Stenographer*
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Joyce Giuliano, *Senior Clerk/Payroll*
Talia Alberti, *Senior Clerk/Cashroom*
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Donald Goddard, *Editor*
Luanne Brauer, *Associate Manager, Corporate Affairs*
Mindy Miller, *Assistant Manager, Corporate Affairs*
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Geoffrey Mellor, *Associate Manager, International Conservation Support*
Matthew Hatchwell, *Assistant Manager, International Conservation Support*
Kathi Schaeffer, *Associate Manager, Aquarium Public Affairs*
M. Elizabeth Brown, *Assistant Manager, Individual Support*
Anne DeMicco, *Assistant Manager, Guest Services*
Marion Estey, *Executive Assistant*
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Deborah Hough, *Data Entry Operator*

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Catherine Belden, *Associate Manager*
Linda Corcoran, *Public Relations Assistant*

Travel

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Women's Committee

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Betty Barford, *Department Coordinator*

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Walter Deichmann, *Creative Director/Exhibits*
Robert Blohm, *Miloon Kothari, Heather Sporn, Exhibit Designers*

Graphics Design

Sharon Kramer, *Creative Director/Graphics*
Ron Davis, *Curtis Tow, Graphic Designers*

Graphics Production

Christopher Maune, *Manager*
Michael Muller, *Thomas O'Flynn, Graphic Specialists*

Exhibition Production

Henry Tusinski, *Supervisor*
Sarah Paul, *Gary Smith, Exhibit Specialists*

Horticulture

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Patrick Ross, *Supervisor*
James Coelho, *Enrique Gonzalez, Patrick Lynch, Dan McKeon, Anthony Quaglia, Veronica Szabo, Maintainers*
Michael Orsino, *John Usai, Gardeners*
Ricardo Cruz, *Assistant Maintainer*

Personnel

Angelo Monaco, *Manager*
John Fairbairn, *Supervisor*
Maryalice Cassidy, *Supervising Departmental Stenographer*
Margaret Bunyan, *Departmental Stenographer*
Denise Sheehan, *Office Aide*

Publications

Animal Kingdom Magazine
Eugene J. Walter, Jr., *Curator and Editor-in-Chief*
Penelope J. O'Prey, *Curator and Executive Editor*
Hend DeVos, *Production Manager*
Deborah Behler, *Nancy Simmons-Christie, Associate Editors*
Miriam Helbok, *Copy Editor*
Sue Margulies, *Production Assistant*
Mary DeRosa, *Departmental Stenographer*
Diana Warren, *Marketing Associate*

Photographic Services

William Meng, *Curator and Manager of Photo Services*
Dennis DeMello, *Associate Photographer*
Kathleen Boldt, *Photo Librarian*



John Gwynne (second from right) accepted the City's special design award from Mayor Koch, attended by Deputy Mayor Diane Coffey, Art Commission President Edward Ames, and Commissioner of General Services Hadley Gold.

Animal Health and Related Research

Emil P. Dolencsek, *Chief Veterinarian*
Janet Stover, *Associate Veterinarian*
Robert A. Cook, *Clinical Resident*
Tracey McNamara, *Pathology Resident*
Minu Chaudhuri, *Endocrinologist*
Ellen Dierenfeld, *Nutritionist*
Judith Dufelmeyer, *Senior Animal Health Technician*
Robin Moretti, *Animal Health Technician*
Vincent Chiacchitta, *Histotechnologist*
Emilee Carrasco, *Reproduction Technician*
Christine Fiorello, *Pathology Secretary*
Virginia Walsh, *Departmental Secretary*
George Fielding, *Robert Montana, Superintendents*
Joseph Plaza, *Andre Simmons, Wild Animal Keepers*
Antonio Aviles, *Maintainer*

Consultants

Henry Clay Frick II, *Obstetrics and Gynecology*
Stephen A. Schwartz, *Pediatrics*
Harold S. Goldman, *Radiology*
Animal Medical Center, *Pathology*
Robert Byck, *Pharmacology*
James F. Grillo, *Surgery*
Julie Kazimiroff, *Dentistry*
Martin Zisblatt, *Dermatology*

New York Zoological Park (Bronx Zoo)

Administration

William Conway, *Director*

Mammalogy

James G. Doherty, *General Curator and Curator, Carter Chair in Mammalogy*
Fred Koontz, *Associate Curator*
Frederick Sterling, *Collections Manager*
Marietta Kalk, *Associate Superintendent*
Frank Casella, *Patrick Thomas, Assistant Supervisors*

Robert Terracuso, *Michael Tiren, Primary Wild Animal Keepers*
Anthony Brownie, *Howard Diven, Thomas Eyring, Margaret Gavlik, Gilbert Gordian, Kate Hecht, Warren Lawston, Francis Leonard, Kathleen MacLaughlin, Joan McCabe, Joseph Neglia, William Shesko, Atanasio Solanto, Philip Steindler, Claudia Wilson, Senior Wild Animal Keepers*
Alph Aversa, *Blakeslee Barnes, Allison Blatz, Patrick Campbell, Lorri D'Angelo, Kitty Dolan, James Dredger, Carolyn Fern, Pamela French, Lorraine Hershonik, Mark Hohlberg, Steven Jagielski, Florence Klecha, Michael Kreger, Linda Lamphere, Diane Lord, Linda Loverro, Joseph Mahoney, Pamela Manning, Patricia Meehan, Pamela Orsi, Linde Ostro, Richard P. Reading, Lorraine Salazar, Scott Silver, Gilbert Stanzone, Gerald Stark, Mark Testa, Lauri Thomas, Kimberly Tropea, John Walke, Lisa Zidek, Martin Zybura, Wild Animal Keepers*
Gregory Kalmanowitz, *Maintainer*
Oscar Rodrigues, *Assistant Maintainer*
Roseanne Theimann, *Supervising Departmental Stenographer*

Ornithology

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Christine Sheppard, *Curator*
Eric Edler, *Gustave Waltz, Superintendents*
Patrick Clarke, *Stephen Diven, Robert Edington, Jean Ehret, Philip Faulhaber, James Gillespie, Frank Paruolo, Robert Reilly, Senior Wild Animal Keepers*
Peter Buchholz, *David Florin, Joy Gonzalez, Lorraine Grady, Kurt Hundgen, Frank Indiviglio, John Kiseda, Susan Maher, James Meieur, Margaret Murphy, John Rodenck, Barbara Santomaso, Lee Schoen, Hans Walters, Johan Wilhelm, Paul Zabaraszkas, Wild Animal Keepers*
Lisa Anderson, *Departmental Stenographer*
Giuseppe deCampoli, *Ostrom Enders, Winston Guest, Jr., Frank Y. Larkin, William K. Macy, Jr., S. Dillon Ripley, Charles Sivelle, Charles D. Webster, Field Associates*

Herpetology

John L. Behler, Jr., *Curator*
Peter J. Brazaitis, *Superintendent*
Bruce Foster, *William Holmstrom, Senior Wild Animal Keepers*
Paul Cowell, *Kathleen Gerety, Joseph Martinez, Wild Animal Keepers*
Gail Bonsignore, *Departmental Stenographer*
Robert Brandner, *William H. Zovickian, Field Associates*

Wildlife Survival Center

John Iaderosa, *Assistant Curator in Charge*
Wendy Turner, *Assistant Curator*
Steve Balzano, *Aviculturist*
James Tamarack, *Zoologist*
Morton Siberman, *Clinical Consultant*

Animal Management Services

Danny C. Wharton, *Associate Curator, Registrar*
Michael Hutchins, *Conservation Biologist*
Steven Johnson, *Supervising Librarian Archivist*
Susan Fraser, *Zoologist, Animal Records*
Nilda Ferrer, *Departmental Assistant*
Katherine Pierson, *Amber Cartha, Office Aides*

Zoo Education

Annette R. Berkovits, *Curator*

General Audience and School Group Program
Graduate Internships, and Teacher Training
Douglas L. Falk, *Assistant Curator, Interpretive Materials*
Ann Robinson, *Assistant Curator, Program Services*
Helena Zengara, *Coordinator, Preschool and Special Education Instructor, Elementary Education*
Donald C. Lisowy, *Instructor, Elementary and Secondary Education*
Susan Elbin, *Instructor, Continuing and Secondary Education*
Patrick Jodice, *Judith Unis, Instructors, Elementary Education*
Thomas J. Veltre, *Audio-Visual Specialist*
Mary A. Urstadt, *Course Registrar*

Children's Zoo and Animal Rides

James J. Breheny, *Assistant Curator, Animal Facilities*
Suzanne Daley, *Don Halmy, Ann Powers, Assistant Supervisors/Instructors*
Ruth Ianuzzi, *Assistant Supervisor/Instructor Camel Rides*
Ann Thayer, *Theater Instructor, Children's Zoo*

Friends of the Zoo

Carole Ferster, *Coordinator*
Shiela R. Goldberg, *Docent Secretary*

Operations

David Cole, *Deputy Director*
Ali Abbad, *Junior Engineer*
Sylvania Casmasima, *Supervising Departmental Stenographer*
Charles B. Driscoll, *Director of Operations Emeritus*



Mammal keeper Tony Brownie with a newborn snow leopard.

Construction

Barry Feliz, *Superintendent*
Harry Sprechman, *General Shop Foreman*
Nick Dimodugno, Samuel Kindred,
Michael Santomaso, Laszek Szempruch,
Patrick Walsh, *Supervising Maintainers*
Barry Apple, Cosmo Barretto, Anthony Bigone,
Abraham Brown, Reynold Byam, Alfreed
Casella, Francis Cushin, Cleve Ferguson,
Errol George, Joseph Goodman, Alfred
Hart, Rudolf Hensen, Van Hutchinson,
Amado Maldonado, Winston Newton, John
Pawlik, Michael Riggio, Mario Rolla, Jr.,
Marconi St. Hills, Edward Scholler, Renzo
Scarazzini, John Sciacchitano, Armando
Serrano, Arkady Smelkenson, Joseph
Spadafino, *Maintainers*
Hylls Julien, Felice Perrella, Jose Rivera,
Jorge Rodriguez, *Assistant Maintainers*
Edward Pape, *Laborer*

Maintenance

Robert Jungblut, *Superintendent*
Arthur Hirt, Jr., Raymond Kalmanowitz,
James Smith, *Foremen*
Eugene Czachowski, William Loughheed,
Maintainers
Willie Atkins, Pablo Cruz, Manuel Cuevas,
James Fermonite, Luis Marrero, William
Ottman, Salvatore Panza, William Patterson,
Charles Waizman, Jr., *Assistant Maintainers*
Dante Milco, *Laborer*
Manuel Garcia, Jr., George Izquierdo, Pedro
Martinez, Carlos Simone, Frank Suarino,
Frank Weiser, *Motor Vehicle Operators*
Norman Inatatsch, *Supervising Attendant*
Francis Porter, *Senior Attendant*
Luis Agudo, Florence Bessire, Richard Brown,
John Bruno, Evelyn Burroughs, Zephieiah
Campbell, Cornelia Carter, Joseph Cerardi,
Pedro DeJesus, John Ferreira Gwendolyn
Hawkins, Matthew Jackson, Theodore Olson,
Arthur Patterson, Natividad Ruiz, Eduardo
Vidal, Richard Wallace, *Attendants*

Visitor Services

Food and souvenirs
Arnold Harlem, *Deputy Director, Business
Services*
Eileen Lyver, *Departmental Stenographer*
Helen Browning, *Senior Clerk*

Food

Joseph Perretta, *Senior Supervisor*
Albert Arroyo, Michele Del Giudice, Alfredo
Piscitelli, *Supervisors*
Charles Betsch, Virginia Castaldi, Carmela
Gargiulo, Mary Looney, *Unit Managers*
Rosalie Barney, Tony Urrico, *Assistant Unit
Managers*
Hazel Gregory, *Cook*

Souvenirs

Kathleen Magee, *Supervisor*
Joseph Trotta, Dolores Papaleo, *Assistant
Supervisors*
Patricia Conte, *Senior Clerk*
Jim Lo, *Storekeeper*

Admissions, Parking, Transportation, and
Group Sales

Peter Nesbitt, *Manager*
Leticia Morales, *Departmental Stenographer*



Giant panda technical staff from China and Bronx Zoo mammal supervisors: (from left) Wang Fuquan, Frank Casella, Pat Thomas, Shi Sengming, Penny Kalk, and Gao Bin.

Admissions

Peter Muccioli, *Assistant Manager*
Laura Kokasko, *Supervisor*
Joseph Liberatore, John Siciliano, *Ticket Agents*

Parking

Elizabeth Mingeram, *Supervising Ticket Agent*
Howard Corbett, *Ticket Agent*

Transportation

Barrington Burgess, George DeSalle, *Visitor
Service Supervisors*
Louis Marcantonio, *Assistant Supervisor*
Ronald Gordon, Jose Imenez, *Assistant
Monorail Mechanics*
Maryann Ruberto, *Assistant Skyride Mechanic*

Group Sales

Margaret Price, *Supervisor*
Carol Burke, *Clerk*

Security

Michael Gallo, *Manager*
Robert Heinisch, *Assistant Manager*
Edward Walker, *Supervisor*
Richard Henry, *Supervising Zoo Park Maintainer*
Steven Carr, Winston Hill, James Williams,
Zoo Park Maintainers

Gino Aguda, Wilbert Barton, Fred Gaines,
Raynor Mattson, Arthur Nelson, Gilbert
Pecunia, William Perez, Howard Roberts,
William Roman, Gregory Upshaw, *Assis-
tant Zoo Park Maintainers*

City Zoos Project

Richard L. Lattis, *Director*
Denise Ouellette McClean, *Department
Coordinator*
Meredith A. Zafonte, *Design Assistant*

Central Park Zoo

James A. Murtaugh, *Curator*
Joseph E. Nissen, *Manager, Operations &
Maintenance*

Wildlife Conservation International

David Western, *Acting Director and Resource
Ecologist, Carter Chair of
Conservation Biology*
George B. Schaller, *Director (on leave) and
Research Zoologist, Foshay
Chair in Wildlife Conser-
vation*

Archie Carr, III, *Assistant Director*
Mary Pearl, *Administrative, Conservation
Programs*

Thomas Struhsaker, *Research Zoologist, Carter
Chair of Rainforest Biology*
Patricia Mochlman, *Staff Zoologist*
Charles Munn, Alan Rabinowitz, Stuart Strahl,
Research Zoologists

Richard Barnes, Elizabeth Bennett, Dee
Boersma, Claudio Campagna, Jacque Carter,
Tim Clark, Thomas Defler, Deborah Glockner-

Ferrari, Rosemarie Gnam, Terese and John Hart, Jesse C. Hillman, Harold Hirth, Margaret Kinnard, Mark Leighon, Dale Lewis, Kim Medley, Mitani, James Powell, A.R.E. Sinclair, Amy Vedder, *Research Fellows*
 Warren Brockelman, James Connor, Graham Harris, Lysa Leland, Esmond Bradley Martin, Katharine Payne, Roger Payne, Ulysses S. Seal, Kenneth Stott, Shirley Strum, Arturo Tarak, *Conservation Fellows*
 Martha Schwartz, *Project Coordinator*
 Nancy Granchelli, *Senior Stenographer*

New York Aquarium

Administration

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 Louis E. Garibaldi, *Associate Director*
 Geraldine Marsteller, *Secretary to the Director*
 Margaret DeMatteis, *Office Aide*

Animal Exhibits

Erwin J. Ernst, *Curator*
 Alysoun Seacat, *Supervising Animal Trainer*
 Pedro Ponciano, *Superintendent of Animals*
 Edward Dols, Peter Femimore, Adrian Gagesteyn, *Senior Keepers*
 Steven Abrams, Richard Crist, Leslie Leffler, Werner Schreiner, *Keepers*
 Roy Riffe, Guenther Skammel, *Senior Trainers*
 Celia Ackerman, Martha Hiatt, *Trainers*
 Myra Schomberg, *Supervising Departmental Stenographer*

Education

Elie Fries, *Assistant Curator*
 Merryl Kafka, *Secondary Instructor/Docent Coordinator*
 Robert Cummings, *Tour Guide/Special Program Coordinator*
 Shelly Beard, *Tour Guide/Program Coordinator*
 Roslyn Turenshine, *Secretary*

Operations

Robert Hayden, *Assistant Director*
 Donald McHugh, *Buildings Superintendent*
 John Santo, *Supervising Maintainer*
 Vincent Capuana, Gertrudis Garcia, Ralph Lette, Kenneth Pritchett, Stanley Reimontowski, Albert Sortino, *Maintainers*
 Joseph Abbramo, Joseph Bivona, George Cox, Timothy Magee, Anthony Mannicello, Fritz Albert Reynolds, *Assistant Maintainers*
 Frank Dellino, *Gardener*
 Charles Burns, *Laborer*
 Howard Dunn, *Senior Attendant*
 Carlos Casanova, Dante Delemos, Rachel Farmer, Henry Lighty, Edwin Lebron, Robert O'Brien, *Attendants*
 Sylvia Jaffe, *Senior Departmental Stenographer*
 Gilda Pagano, *Switchboard Operator*
 Delores Hinton, *Matron*

Visitor Services

Elaine Zirkes, *Assistant Manager*
 Deborah Norris, *Clerk*
 Florence Goldberg, *Ticket Agent*

James Madden, *Unit Manager*
 Maria Shields, *Assistant Unit Manager*

Security

Robert Jansen, *Manager*
 Salvatore DeFeo, *Assistant Manager*
 Ricky Jackson, *Maintainer*
 Louis Almeida Samuel Black, Richard Jayroe, Edwin Rodriguez, *Assistant Maintainers*

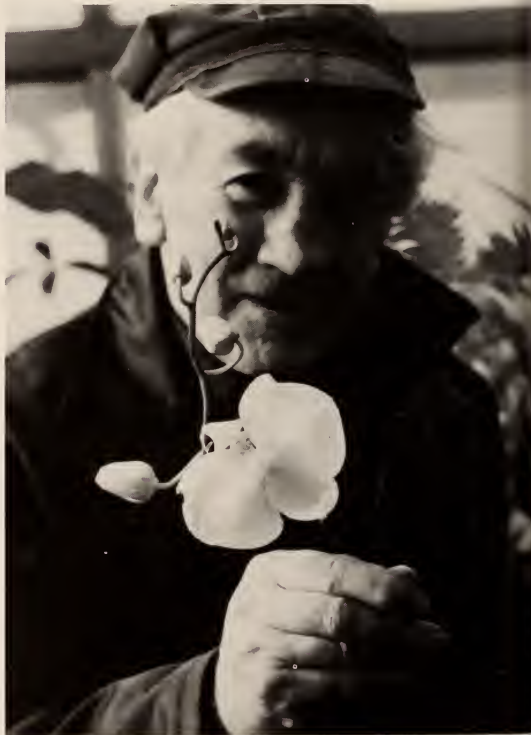
Osborn Laboratories of Marine Sciences

George D. Ruggieri, S.I., *Director and Experimental Embryologist, Carter Chair of Marine Sciences*

Ross F. Nigrelli, *Senior Scientist*
 Klaus D. Kallman, *Fish Geneticist*
 Naftali Primor, *Toxicologist*
 Paul J. Cheung, *Pathologist*
 Anthony D'Agostino, *Invertebrate Biologist*
 Maya Natenson, *Research Assistant*
 Catherine McClave, Shelagh Palma, Galina Powerman, *Laboratory Technicians*
 Frances Hackett, *Senior Departmental Stenographer*

Research Associates

Eli D. Goldsmith, *Scientific Consultant*
 John A. Chamberlain, Jr., *Paleobiogeology*
 Joseph Gennaro, *Electron Microscopy*
 Myron Jacobs, Ilya Glezer, Peter J. Morgan, *Cetacean Neuroanatomy*
 Martin P. Schreiman, *Fish Endocrinology*



Pat Lynch, 31 years on the Zoo's Horticulture staff.

(continued from page 2)

Funding the Society's Programs

To operate programs of such wide range and magnitude cost \$39,918,425 in fiscal year 1987, including capital outlays totaling \$6,608,467. A summary of financial information for the period ending June 30, 1987, appears on pages 57-67 of this report.

Income from government agencies—mainly in the form of New York City payments of keeper salaries and fuel costs, and funds from New York State through the Natural Heritage Trust—accounted for \$10,503,941, or 27 percent of the Society's revenues. Other income is provided by admissions and visitor services at the Bronx Zoo and New York Aquarium (\$15,208,728, or 39 percent); private contributions, membership dues, earned income, and endowment (\$11,660,637, or 30 percent); and publications, education programs, and miscellaneous sources (\$1,589,091, or 4 percent). The base of support is broad, and growing. At June 30, 1987, the Society had 30,816 members and more than 20,000 annual contributors, including individuals, foundations, and corporations.

For fiscal 1988, the Society's expenditure budget has been projected at \$58,000,000, with the inclusion of Central Park Zoo capital and operating costs. The Society completed a \$20 million capital drive in 1982, which helped to raise endowment and finance several important projects, including the new Children's Zoo. From 1983 through June 1987, the Second-Century Campaign raised more than \$24 million for capital projects, including JungleWorld, Himalayan Highlands, and the Elephant House renovation at the Bronx Zoo; Discovery Cove and Sea Cliffs at the Aquarium; and construction of the new Central Park Zoo.

With increased responsibility for wildlife survival and growing public interest in nature and conser-

vation, the Society is now conducting a long-range planning effort that will help to redefine and further develop its overall program and many of its facilities.

Recommended Form of Bequest

The Trustees of the Society recommend that for estate planning purposes, members and friends consider the following language for use in their wills:

"To the New York Zoological Society, a not-for-profit, tax-exempt membership organization incorporated by the laws of the State of New York in 1895, having as its principal address the New York Zoological Park, Bronx, New York 10460, I hereby give and bequeath _____ for the Society's general purposes."

In order to help the Society avoid future administrative costs, it is suggested that the following paragraph be added to any restrictions that are imposed on a bequest:

"If at some future time in the judgment of the Trustees of the New York Zoological Society, it is no longer practicable to use the income or principal of this bequest for the purposes intended, the Trustees have the right to use the income or principal for whatever purpose they deem necessary and most closely in accord with the intent described herein."

If you wish to discuss the language of your bequest with a member of the Society's staff, please be in touch with the President's office (212) 220-5115.

Howard Phipps, Jr.
President

Credits

Design: Gaylord Hoftiezer, Noreen Fogel
Incentra International, Inc., New York

Editor: Donald Goddard

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1986-87 Highlights and Vital

Statistics

Attendance for the year ending June 30, 1987, totaled 2,183,357 at the Bronx Zoo and 706,622 at the New York Aquarium, the latter figure representing a 70 percent growth over the past seven years.

Membership in the Society rose to 30,816. Contributions to the Society from foundations, corporations, and individuals—including dues, gifts, pledges, and bequests—totaled \$18,678,081.

Animal Kingdom, the Society's national magazine, reached a new high of 155,437 subscribers.

Born or hatched at the Bronx Zoo, New York Aquarium, and Wildlife Survival Center during the year were more than 1,500 mammals, birds, reptiles, amphibians, and fishes.

Noteworthy offspring included Osa, Osh, and Pavel, snow leopards; Andy, babirusa; Vanna, polar bear; O.T. and M.O.T., palm cockatoos; three California sea lions; one lowland gorilla; two proboscis monkeys; one white-checked gibbon; two Waldrapp ibis; two helmeted curassows; sixteen radiated tortoises; thirty-four Coahuilan box turtles; eighteen broad-nosed caiman; several pot-bellied seahorses; and a variety of cichlids.

At the end of 1986, the New York Zoological Society was responsible for 4,273 animals of more than 650 species and subspecies at the Bronx Zoo, 319 animals of 41 species at the Wildlife Survival Center, and 2,577 animals of 304 species (plus numerous invertebrates) at the New York Aquarium.

Interzoo breeding loans involved the exchange of 554 animals between the Society and 114 other institutions.

Himalayan Highlands, a mountain and marsh habitat for snow leopards, red pandas, tragopans, and white-naped cranes, opened at the Bronx Zoo on September 26, 1986. The exhibition of Yong Yong and Ling Ling, giant pandas on six-month loan from China, began on April 30, 1987. The Aquarium celebrated its 90th anniversary on December 10, 1986, with the inauguration of the Red Sea Exhibit and a photographic historical retrospective.

Wildlife Conservation International (WCI) sponsored 57 field projects in 30 countries, including new initiatives in Kenya, the Philippines, Papua New Guinea, Nepal, China, Belize, the Dominican Republic, and Venezuela.







